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Appendix I	Additional Natural Biohazards Information

The State of Louisiana has suffered innumerable losses of lives and property from natural hazards. With 40 presidential disaster declarations since 1972, the State has the fifth most declarations in the United States. Hurricanes, floods, and tornadoes, among other hazards, have challenged the State to develop ways of reducing future damages from hazards.

This document is a first step toward the development of a comprehensive plan for damage prevention. As required by federal regulations under the Disaster Mitigation Act of 2000, the hazard profiles contained in this document provide an overview of the natural hazards and technological and other hazards that can affect Louisiana. In this report, natural hazards include those caused by naturally occurring climatological, geological, hydrologic, or seismic events, while technological and other hazards include those that are created or heavily influenced by human actions. The hazard profiles presented include information on the likelihood of occurrence, possible magnitude or intensity, areas of the State that can be affected (maps are included where appropriate), and conditions that influence the manifestation of the hazard. With this information, the State of Louisiana can assess the State's vulnerability to hazards in terms of casualties and property damage and include its findings in the State Hazard Mitigation Plan.

The hazards profiled were selected in part from a comprehensive list of hazards found in the 1997 Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy by the Federal Emergency Management Agency (FEMA). This document served as a source of preliminary investigation to eliminate from further consideration hazards that are not significant threats to Louisiana. Table 1 lists the broad range of hazards evaluated and describes the disposition of the preliminary investigation.

Table 1: Disposition of Hazards Evaluated in Preliminary Investigation

Natural Climatic and Geologic Hazards	
Hazard	Disposition
Coastal Erosion	Included in "Land Failure Hazard Profile"
Drought	Profiled in "Drought Hazard Profile"
Earthquake	Profiled in "Earthquake Hazard Profile"
Expansive Soil	Not a significant threat and therefore is not profiled
Extreme Summer Weather	Occurs in Louisiana, but is not considered a significant threat in comparison to other significant climatic events and therefore is not profiled
Flood	Profiled in "Flooding Hazard Profile"
Hailstorm	Profiled in "Hailstorms"
Hurricane (Tropical Cyclone)	Profiled in "Hurricane Hazard Profile"
Land Subsidence	Profiled in "Land Failure Hazard Profile"
Landslide	Not a significant threat and therefore is not profiled
Severe Winter Storm	Profiled in "Severe Winter Storm Hazard Profile"
Snow Avalanche	Not a significant threat and therefore is not profiled
Storm Surge	Included in "Hurricane Hazard Profile"

Table 1: Disposition of Hazards Evaluated in Preliminary Investigation

Natural Climatic and Geologic Hazards	
Thunderstorm and Lightning	Occur in Louisiana, but are not considered a significant threat in comparison to other significant climatic events and therefore are not profiled
Tornado	Profiled in “Tornado Hazard Profile”
Tsunami Event	Not a significant threat and therefore is not profiled
Volcano	Not a significant threat and therefore is not profiled
Wildfire	Profiled in “Wildfire Hazard Profile”
Windstorm	Occur in Louisiana, but is not considered a significant threat in comparison to other significant climatic events like hurricanes and tornadoes, and therefore is not profiled
Technological and Other Hazards	
Hazard	Disposition
Hazardous Material	Profiled in “Hazardous Materials Hazard Profile”
Natural Biohazard	Profiled in “Natural Biohazards Profile”
Nuclear Facilities	Included “Hazardous Materials Hazard Profile”
Dams and Levees	Profiled in “Dams and Levees Profile”

Accordingly, 12 hazards are profiled in this document: natural hazards, including drought, earthquake, flood, hailstorm, hurricane, land failure, severe winter storms, tornado, wildfires, and technological and other hazards, dams and levees, hazardous materials, and natural biohazards.

2.1 NATURE OF THE HAZARD

Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 2 below presents definitions for these types of droughts.

Table 2: Drought Classification Definitions

Term	Definition
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on streamflows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.
Source: <u>Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy</u> , FEMA	

Louisiana, although featuring several large water bodies, thousands of miles of rivers, streams, and bayous, and thousands of acres of wetlands, has experienced occasional drought conditions. Northern parishes, especially, have experienced agricultural droughts, leading to severe soil-moisture decreases that have had serious consequences for crop production.

The Mississippi and Atchafalaya Rivers are dependent upon rain that falls north of the State; therefore, droughts in other parts of the country can significantly reduce the flow of these rivers.

2.2 DISASTER HISTORY

The 1988 drought in the upper Midwest and High Plains resulted in record low river stages in the lower Mississippi, even though rainfall in Louisiana was above normal for that year. Waterway traffic along the Mississippi and Atchafalaya Rivers was brought to a near-standstill for several weeks, and water supplies for several river-dependent parishes were threatened by low flows and salt-water intrusion.

Historical review indicates that a highly significant relationship exists between southern Louisiana precipitation and the establishment of La Niña weather patterns. La Niña, characterized by unusually cold ocean temperatures in the Pacific, can bring abnormally warm and dry weather conditions to Louisiana. For example, during the mid-1998 to 2000 period, the State shifted to a drier weather pattern. The year 2000 was the driest winter in over 100 years.

During about 80 percent of past significant La Niña occurrences, winter and spring rainfall has been below normal.

2.3 PROBABILITY OF OCCURRENCE AND MAGNITUDE

Map 1 shows the national variations of the July to January mean river and stream flow information maintained by the United States Geological Survey (FEMA, 1997). The southern half of the State of Louisiana, shown in light yellow, represents stream flows greater than 2 cubic feet per second per square mile. Indicative of the region's high precipitation, low evapotranspiration, and low runoff potential due to a very flat, low-lying topography, however, rivers and streams in the northern and western parts of the state have lower mean flows. The July to January mean monthly flow with non-exceedance probability of 0.05 was selected as the threshold to characterize hydrologic drought. The July to January mean monthly stream flow will be less than this value, on average, once in 20 years. There is no commonly accepted return period or non-exceedance probability for defining the risk from hydrologic droughts that is analogous to the 100-year or 1 percent annual chance flood.

While Louisiana has suffered agricultural droughts in its northern parishes, droughts of such magnitude that they require urban and suburban water restrictions are rare.

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Map 1: Hydrologic Drought

3.1 NATURE OF THE HAZARD

An earthquake is a sudden motion or trembling of the earth caused by an abrupt release of stored energy in the rocks beneath the earth's surface. The rocks that make up the earth's crust are very brittle. When stresses due to underground tectonic forces exceed the strength of the rocks, they will abruptly break apart or shift along existing faults. The energy released from this process results in vibrations known as seismic waves that are responsible for the trembling and shaking of the ground during an earthquake.

Although Louisiana lies in an area of low seismic risk, a number of earthquakes have occurred in the State over the last 200 years. These earthquakes have had two distinct sources: a system of subsidence faults (also known as "growth faults") in southern Louisiana, and the New Madrid seismic zone to the north of Louisiana. Most of these earthquakes were of low magnitude and occurred infrequently.

The system of subsidence faults in southern Louisiana shown on Map 2 developed due to accelerated land subsidence and rapid sediment deposition from the Mississippi River. The system stretches across the southern portion of the State of Louisiana from Beauregard Parish in the east to St. Tammany Parish in the west, and includes every Parish to the south of this line. This system is thought to be responsible for many of the recorded earthquakes from 1843 to the present (see Appendix A). All of the earthquakes that occurred over this period of time were of low magnitude, resulting mostly in limited property damage – i.e., broken windows, damaged chimneys, and cracked plaster.

While faults throughout the northwestern parishes of Louisiana, depicted in green on Map 2, are thought to be inactive, the New Madrid seismic zone lies just to the north of Louisiana and originates in the region of New Madrid, Missouri. The magnitude of past earthquakes originating in the New Madrid seismic zone is far greater than anything generated by the subsidence fault system in coastal Louisiana. Therefore, a significant seismic event from the New Madrid seismic zone is more likely to have a greater impact on Louisiana not only because of the greater magnitude of the earthquake, but also because of the proximity of Louisiana to the seismic zone.

3.2 DISASTER HISTORY

A number of earthquakes have occurred over the past 200 years, 43 of which were recorded by the U.S. Geological Survey (USGS) (see Appendix A). Most of these earthquakes were very minor. Map 2 shows the location of all felt historical earthquakes during this period. The two most significant historic earthquakes in Louisiana were the New Madrid earthquakes (1811-1812) and the 1930 earthquake in Donaldsonville in southern Louisiana which measured 4.2 on the Richter scale.

The New Madrid earthquake was one of the largest earthquake events ever to occur in the United States. Occurring near New Madrid, Missouri, from December 16, 1811, to February 7, 1812, a number of earthquakes originated in this region, with the three strongest earthquakes thought to have magnitudes between 8.4 and 8.7 on the Richter scale. The strongest tremors were felt from

Map 2: Louisiana Earthquake Hazard Map

New Orleans to Quebec and the course of the Mississippi River was permanently changed. The aftershocks went on for more than 5 years after the initial series of earthquakes.

The largest recorded earthquake event in Louisiana occurred in Donaldsonville on October 19, 1930. The earthquake was felt over a 15,000-square-mile area of southeastern Louisiana. The towns that suffered the most damage were Donaldsonville, Gonzales, Napoleonville, and White Castle. There were reports of damaged brick chimneys, broken windows, and overturned small objects. Other towns affected were Morgan City, Franklin, Elemans, Berwick, and Plaquemine. These towns reported doors and windows rattling, houses creaking, and hanging objects swinging.

3.3 PROBABILITY OF OCCURRENCE

Figure 1 also displays the probability of exceeding a certain ground motion, expressed as peak ground acceleration (PGA). This particular map shows the 10% probability of exceeding normal ground motion in 50 years. This translates to a 1 in 475 chance of normal ground motion being exceeded by the amount shown on the map annually. The southern half of the state has the lowest PGA in the state of 1 percent gravity (1%g). Only the northeastern part of the state has a PGA of 3%g—quite low when compared to the New Madrid Seismic Zone, which has a PGA as



Figure 1: Peak Acceleration with 10% Probability of Exceedance in 50 Years (USGS)

high as 40%. It is important to note that this map expresses a 10% probability; there is a 90% percent chance that normal ground motions will not be exceeded.

3.4 MAGNITUDE AND INTENSITY

There are several different ways to express the severity of an earthquake. The two most common are magnitude, which is the measure of the amplitude of the seismic wave and is expressed by the Richter scale, and intensity, which is a measure of how strong the shock was felt at a particular location, expressed by the Modified Mercalli Intensity (MMI) scale. The Richter scale represents a logarithmic measurement where an increase in the scale by one whole number represents a tenfold increase in measured amplitude of the earthquake. Table 3 shows the rough correlation between the Richter scale, Peak Ground Acceleration (PGA), and MMI. The relationship between PGA, magnitude, and intensity are, at best, approximate, and also depend upon such specifics as the distance from the epicenter and depth of the epicenter.

Table 3: Earthquake Magnitude / Intensity Comparison

PGA (in %g)	Magnitude (Richter)	Intensity (MMI)	Description (MMI)
<0.17	1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	II. Felt only by a few persons at rest, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rock noticeably. V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

Table 3: Earthquake Magnitude / Intensity Comparison

PGA (in %g)	Magnitude (Richter)	Intensity (MMI)	Description (MMI)
34 - 124	6.0 - 6.9	VII - IX	<p>VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.</p> <p>IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.</p>
>124	7.0 and higher	VIII or higher	<p>X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.</p> <p>XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.</p> <p>XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.</p>

Source: Wald, D., et al., "Relationship between Peak Ground Acceleration, Peak Ground Motion, and Modified Mercalli Intensity in California."

Developed by the Central United States Earthquake Consortium (CUSEC), Figure 2 depicts a hypothetical earthquake in the New Madrid region with a magnitude of MMI VIII, similar to the magnitude of the 1811-1812 New Madrid earthquakes. An earthquake at this magnitude would be felt in the northern reaches of Louisiana at a magnitude of MMI VI. According to Table 3, earthquakes at this magnitude would be felt by all, move heavy furniture, and cause slight damage.

With a history of strong tremors originating from the New Madrid seismic zone reaching into northern portions of the State and an active fault system and past earthquakes in the southern half of the State, the evidence indicates that the most severe earthquakes in the state are most likely to occur to the very north (near the Arkansas - Mississippi border) and to the south (near the coast).

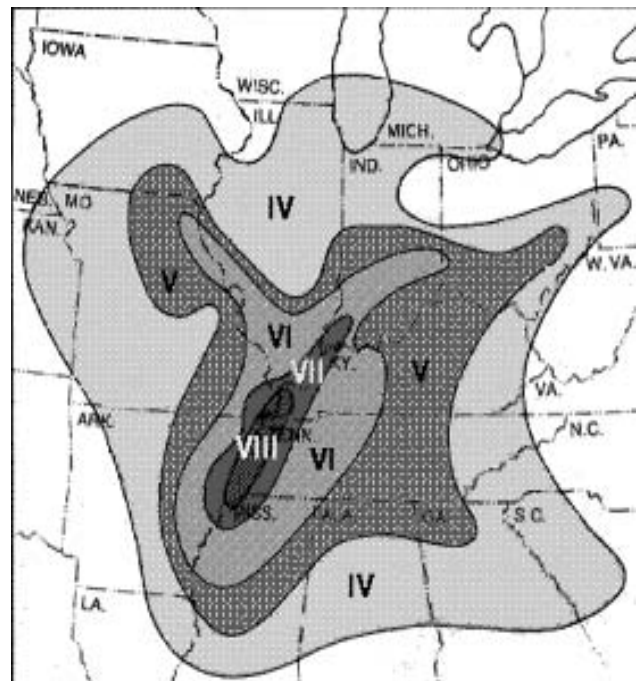


Figure 2: Map of New Madrid Seismic Zone showing where a hypothetical magnitude 8 (VIII) earthquake would be felt and at what magnitude (CUSEC).

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4.1 NATURE OF THE HAZARD

A flood is a natural event for rivers and streams. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains -- lowlands adjacent to rivers, lakes, and oceans that are subject to recurring floods. While many floodplain boundaries are mapped by FEMA's National Flood Insurance Program (NFIP) mapping program, floods sometimes go beyond the mapped floodplains or change courses due to natural processes (e.g., accretion, erosion, sedimentation, etc.) or human development (e.g., filling in floodplain or floodway areas, or increased imperviousness within the watershed from new development). Floodplains in the U.S. are home to over nine million households. Most injuries and deaths occur when people are swept away by flood currents, and most property damage results from inundation by sediment and debris-filled water. Hundreds of floods occur each year, making flooding one of the most common hazards in all 50 states and U.S. territories.

Flooding is a potential threat in virtually every section of Louisiana and is Louisiana's most prevalent and pervasive natural hazard threat. Louisiana is located along the southernmost part of the Mississippi River Basin, which has the largest drainage of any basin in North America. The State's sub-tropical climate has the potential for producing heavy rainfalls during any time of the year. Rains of up to 10 inches in a 2-day period are not rare and are capable of producing considerable flooding. The major source of moisture is the Gulf of Mexico, from which summer thunderstorm systems, tropical storms, and hurricanes can bring intense rainfall. Mean annual precipitation decreases to the west and north, with the northwest corner of the state receiving an average of 48 inches annually, in contrast to the delta area in southeastern Louisiana receiving an average of about 64 inches of precipitation annually and the northwest corner of the State receiving an annual average of 48 inches.

Flooding along the Mississippi and Atchafalaya Rivers results more often from upstream runoff rather than local rainfall (LOEP, 2001). Major flooding on these waterways can have serious impacts on river and barge traffic, especially along the Mississippi, where cargo handling at the Port of New Orleans is a major industry for Louisiana. Furthermore, the proliferation of riverboat casinos along the river may have repercussions for emergency response operations. Flood stage levels that trigger emergency response may need to be adjusted to allow additional time for responders to deal with additional traffic, potential property damage, and the tourist population at risk.

Over the past century, there has been an apparent increase in large rainstorms and resultant flooding associated with frontal activity, particularly in the late winter and spring (LOEP, 2001). Frequent flooding is of particular concern in areas of active growth and development.

4.2 DISASTER HISTORY

Louisiana has experienced several severe flooding events. In fact, of the 40 presidential declarations received by Louisiana since 1965, 22 have resulted from flood damages. Table 4 shows the total number of declarations received by parishes affected by declared flood disasters. Appendix B presents this information by the date of the declarations.

Table 4: Number of Presidential Flood Declarations by Parish

Parish	Total	Parish	Total	Parish	Total
St. Tammany	9	Ouachita	6	St. Mary	4
Ascension	8	Richland	6	Union	4
La Salle	8	St. Bernard	6	Vernon	4
Livingston	8	St. Charles	6	West Carroll	4
Rapides	8	Terrebonne	6	Winn	4
St. Martin	8	Avoyelles	5	Iberia	3
Caldwell	7	Bienville	5	Jefferson Davis	3
Catahoula	7	Calcasieu	5	Madison	3
East Baton Rouge	7	East Feliciana	5	Red River	3
Franklin	7	Morehouse	5	Sabine	3
Iberville	7	Washington	5	West Feliciana	3
Jefferson	7	Webster	5	Acadia	2
Lafayette	7	Allen	4	Cameron	2
Lafourche	7	Bossier	4	De Soto	2
Orleans	7	Caddo	4	East Carroll	2
Pointe Coupee	7	Claiborne	4	Jackson	2
Tangipahoa	7	Concordia	4	St. Helena	2
Vermilion	7	Lincoln	4	Tensas	2
Assumption	6	St. James	4	West Baton	2
Beauregard	6	St. John the	4	Evangeline	1
Grant	6	St. Landry	4	Plaquemines	1
Natchitoches	6				

Source: LOEP

One significant flood occurred in April 1983, when rain fell at a rate of about 1 inch per hour. A frontal system from the Gulf of Mexico brought warm, moist air inland, producing intense thunderstorms that produced as much as 17 inches in 5 days in parts of southeastern Louisiana. Because soils were already saturated before the storms, streams experienced intense runoff, exceeding the 100-year flood in many areas. Streamflow gauges monitored by the USGS showed that 181 of 491 gauges recorded peak discharges, and 50 sites had their greatest recorded discharges with 20 of these equaling or exceeding the 100-year flood.

In May 1990, torrential rains produced flooding along the rivers in Louisiana, causing over \$1.0 billion in damage costs. Another large storm system in May 1995 brought rains, hail, and tornadoes that crossed much of southeast Louisiana and the New Orleans area. Between 10 and 25 inches of rain fell in 5 days, resulting in \$5.0 - \$6.0 billion in damages, 32 deaths, and disaster declarations for 12 parishes (see Appendix B).

In June 2001, remnants of Tropical Storm Allison moved across Louisiana, causing severe flooding throughout Louisiana. Thousands of homes were flooded, and innumerable streets were made impassable. The event brought up to 30 inches of rain in some areas. The heavy rainfall caused the Bogue Falaya River at Covington, St. Tammany Parish, to exceed flood stage for several days, cresting twice with near-record flooding, threatening levees and producing major flooding. In St. John the Baptist Parish, a levee broke along Bayou Manchac, flooding roadways and cutting off access to many houses. Major flooding occurred on the lower portions of the Amite and Comite Rivers, with the highest waters levels observed since 1983. All told, the flooding caused nearly \$30 million in damages, resulting in disaster declarations for 27 parishes (see Appendix B).

4.3 PROBABILITY OF OCCURRENCE AND MAGNITUDE

Flood studies identify floodplain areas and associate possible flood elevations in the floodplains with probabilities of occurrence. Generally, floods with higher flood stages have lower chances of occurring. Minor flooding is virtually a yearly occurrence for a number of rivers and tributaries, but major floods also occur regularly in Louisiana. Map 3 shows the extent of 100-year floodplains in Louisiana (27 of the 64 parishes have no Q3 digital floodplain data, and therefore, have no 100-flood zones depicted. East Feliciana and Jackson parishes do not participate in the NFIP). Over 27% of land in Louisiana, particularly the southern parishes, lies within 100-year floodplains—floodplains with a 1% chance on average of being inundated in any given year.

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Map 3: Louisiana 100-Year Flood Zones

5.1 NATURE OF THE HAZARD

Hailstorms are severe thunderstorms in which chunks of ice fall along with rain. Hail develops in the upper atmosphere, as ice crystals are bounced about by high velocity updraft winds and accumulate frozen droplets, falling after developing enough weight. The size of hailstones varies and is a direct consequence of the severity and size of the thunderstorm—the higher the temperatures at the Earth's surface, the greater the strength of the updrafts and the amount of time hailstones are suspended. Hailstorms generally occur more frequently during the late spring and early summer, a period of extreme variation between ground surface temperatures and jet stream temperatures, producing the strong updraft winds needed for hail development.

5.2 DISASTER HISTORY

A storm on April 22, 1995, brought hailstones as large as 4.5 inches in diameter and caused about \$50 million in property damages to the Shreveport metropolitan area, including Bossier and Caddo Parishes (see Figure 3).

As shown on Table 5, on January 23, 2000, a hailstorm caused significant damage to property in the New Orleans metropolitan area, including Jefferson, Orleans, and St. Bernard Parishes. Ranging from dime to golf ball-size, the hail damaged roofs, windows, and vehicles, resulting in nearly 42,000 homeowner and 37,500 auto insurance claims at an estimated cost of \$353 million. The Institute for Building and Home Safety (IBHS) identified this storm as the eighth most damaging storm in the nation in the period from 1994 to 2000.

Table 5: Top 10 National Hailstorm Events, 1994-2000

Rank	Date	Primary Location	Loss Amount
1.	5-15-98	Minn.-St. Paul, MN	\$1.73 billion
2.	5-5-95	Ft. Worth, TX	\$929 million
3.	4-19-96	Indianapolis, IN	\$658 million
4.	5-18-00	Chicago suburbs, IL	\$572 million
5.	4-25-94	Dallas-Ft. Worth, TX	\$542 million
6.	4-23-99	Northern Virginia	\$394 million
7.	7-7-00	Minn.-St. Paul, MN	\$381 million
8.	1-23-00	New Orleans, LA	\$353 million
9.	5-3-96	Louisville, KY	\$339 million
10.	4-16-98	Bowling Green, KY	\$290 million

Source: IBHS 2002 Annual Conference, "Hailstorm Loss Database," PowerPoint Presentation, November 12, 2002

5.3 PROBABILITY OF OCCURRENCE AND MAGNITUDE

Between 1955 and 2002, Louisiana experienced 792 days with hailstorms, an average of 17 storms annually. The average size of hailstones in Louisiana is 1.27 inches, and

the median size is 1.00 inch. Statewide, there is a statistical chance of 13% on any given day of having a hailstorm with hailstones of any size (this represents a *statistical* probability calculated mathematically based on the occurrence of past hailstorm events, not a probability founded on a



Figure 3: Hail stones in Louisiana have reached as large as 4.5" across.

climatological or meteorological study). There is an 8.65% chance of having a hailstorm with hailstones at least 1 inch in diameter (probability by hailstone size and by parish is shown in Appendix C, Additional Hailstorm Information).

5.4 SEVERITY

Hailstorms can cause widespread damage to homes and other structures, automobiles, and crops. While the damage to individual structures or vehicles is often minor, the cumulative costs to communities, especially across large metropolitan areas, can be quite significant. The severity of hailstorms depends on the size of hailstones, the length of time the storm lasts, and occurrence in developed areas.

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<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms>.

6.1 NATURE OF THE HAZARD

Hurricanes and tropical storms are large-scale systems of severe thunderstorms that develop over tropical or subtropical waters and have a defined, organized circulation. Hurricanes have a maximum sustained (meaning 1-minute average) surface wind speed of at least 74 mph, and tropical storms have wind speeds from 39 to 74 mph.

The central Gulf of Mexico coastline is among the most hurricane-prone locations in the U.S. While the Atlantic Basin hurricane season officially extends from June 1 to November 30, Louisiana has experienced storms as early as late May and has not experienced a storm during the month of November for more than 100 years. The peak of activity occurs in September. Hurricanes and tropical cyclones get their energy from warm waters and lose strength as the system crosses land. Hurricanes and tropical storms can bring severe winds, storm surge flooding along coastal regions, high waves, coastal erosion, extreme rainfall, thunderstorms, lightning, inland flooding, and tornadoes. Among these, storm surge, an increase above the normal astronomical high tide of tidally influenced bodies of water, is perhaps the most threatening hurricane-related hazard to Louisiana. Intense storms with high wind speeds and low barometric pressures drive water across the coast, increasing the elevation of water. Storm surges inundate coastal floodplains, cause backwater flooding through coastal river mouths, and generate large waves that run up and flood coastal beaches.

Maps 4 and 5 show the large expanse of land along southeastern Louisiana that can be affected by storm surges of category 3 and category 5 hurricanes, respectively. The maps represent the cumulative storm surges for hundreds of modeled hypothetical hurricane tracks; no single hurricane event would produce the inundation pattern depicted in the maps. Shallow coastal bathymetry increases the magnitude of storm surge. The coastal bathymetry of southeastern Louisiana, with its low, flat topography and land surface elevations that in many places dip below sea level, can experience storm surges up to 100 miles inland. Furthermore, lakes along the coast, namely, Lake Maurepas, Lake Borgne, and Lake Pontchartrain, exacerbate the effects of coastal flooding because of wave effects that can regenerate over inland lakes.

Another serious hurricane hazard for Louisiana is high wind. Map 6 depicts the inland wind decay of a category 3 hurricane as the eye (the center of the hurricane around which storm winds spiral) moves inland at a forward speed of 12 knots. The figure shows that all of Louisiana, including its northern reaches, can experience strong tropical storm- to hurricane-force winds. Coastal and inland areas are both vulnerable both to hurricane-spawned tornadoes.

Some hurricanes and tropical storms have enough moisture to cause extensive flooding throughout the State, often to the 100- or 500-year flood elevation.

6.2 DISASTER HISTORY

Between 1886 and 2002, Louisiana had 27 direct hurricane landfalls. It received 12 presidential declarations between 1965 and 2002. Only four hurricanes have made landfall as major

Map 4: Category 3 Hurricane Storm Surge Inundation

Map 5: Category 5 Hurricane Storm Surge Inundation

Map 6: Category 3 Inland Wind Decay

hurricanes of category 4 or 5 intensity (see Table 7) – unnamed hurricanes in 1909 and 1915, Hurricane Audrey in 1957, and Hurricane Camille in 1969. Map 7 depicts hurricane tracks that have crossed Louisiana from 1851 to 2001, and Appendix D presents information on past hurricane and tropical storm average wind speeds. Table 6 presents more historical hurricane facts for the State of Louisiana.

Table 6: Louisiana Hurricane Historic Facts

First Recorded Storm	September 1711
Earliest Tropical Storm	April 03, 1846
Longest period between storms	18 years (September 1722 - September 1740)
Shortest period between storms	10 days (August 22, 1879 - September 01, 1879)
Most storms in a single year	3 (1860, 1985, 1998)
Highest death total	2,000 (October 1893)
Highest death total this century	556 (Audrey, June 1957)
Most monetary damage	\$25 billion (Andrew, August 1992)
Most powerful storm at landfall	Camille, August 1969 (Category 5)

Source: USGS, "Environmental Atlas of Lake Pontchartrain,"

<http://pubs.usgs.gov/of/2002/of02-206/phy-environment/>

Hurricane Betsy in August 1965 made landfall at Grand Isle, Louisiana; bringing 160 mph gusts and a 15.7-foot storm surge that flooded the entire island. Winds gusted to 125 mph in New Orleans and storm surge with a height of 9.8-foot caused major flooding. Most of southeast Louisiana had winds reaching 100 mph, and areas inland as far as Monroe had winds exceeding 60 mph. Offshore oil rigs, public utilities, and commercial boats all suffered severe damage, resulting in over \$1 billion in disaster costs. Fifty-eight people in the State lost their lives.

Hurricanes have proven to be Louisiana's costliest and deadliest natural phenomenon. At least three storms have produced 200 or more deaths, including the storm of 1893, in which roughly 2000 lives were lost. Hurricanes Betsy in 1969 and Andrew in 1992 both created losses of about \$1 billion. Most recently, Louisiana has received presidential disaster declarations for Tropical Storm Allison in June 2001, Hurricane Isadore in September 2001, and Hurricane Lili in October 2002 (see "Flood Hazard Profile" for more information about the Tropical Storm Allison event). Hurricane Lili made landfall in Louisiana as a category 1 hurricane, having dropped rapidly from a category 4 just before landfall. The hurricane caused 3 to 5 feet of storm surge tides across most of coastal southeast Louisiana and 4 to 7 feet across south Lafourche and Terrebonne parishes. The storm surge overtopped or breached several locally built levees and flooded over 1,000 homes and businesses in Terrebonne Parish. Along Lake Pontchartrain and Maurepas, the storm flooded low-lying roadways and structures. Figure 4 shows the rainfall footprint for Hurricane Lili. The figure shows rain accumulation of up to 10 inches after Hurricane Lili made landfall over coastal Louisiana and proceeded northward over the Mississippi River Valley.

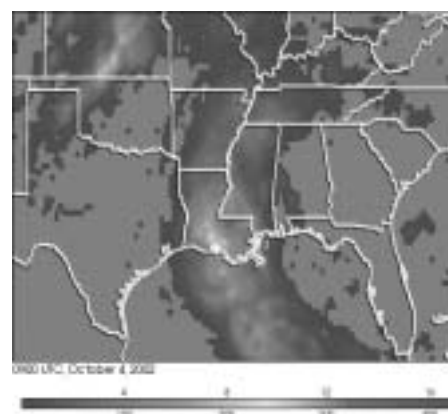


Figure 4: Hurricane Lili rainfall footprint (NASA).

Map 7: Historical Hurricane Tracks, 1851-2001

6.3 FREQUENCY OF OCCURRENCE AND MAGNITUDE

Hurricane magnitude is measured on the Saffir-Simpson hurricane scale, shown in Table 7, which categorizes hurricane magnitude by wind speeds and storm surge above normal sea levels. However, hurricanes and tropical storms, even those of low wind strengths, can also bring torrential rains, causing extensive inland and coastal flooding.

Table 7: Saffir-Simpson Hurricane Scale

Category	Wind Speed	Storm Surge (feet above normal sea level)	Expected Damage
1	74-95 mph	4-5 ft.	Minimal: Damage is done primarily to shrubbery and trees, unanchored mobile homes are damaged, some signs are damaged, no real damage is done to structures.
2	96-110 mph	6-8 ft.	Moderate: Some trees are toppled, some roof coverings are damaged, major damage is done to mobile homes.
3	111-130 mph	9-12 ft.	Extensive: Large trees are toppled, some structural damage is done to roofs, mobile homes are destroyed, structural damage is done to small homes and utility buildings.
4	131-155 mph	13-18 ft.	Extreme: Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail; some curtain walls fail.
5	> 155 mph	> 18 ft.	Catastrophic: Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures and entire buildings could fail.

Source: Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA. 2001.

Louisiana has had four hurricanes of category 4 or 5. As Table 7 shows, hurricanes of this magnitude have sustained winds reaching up to 155 mph, have storm surge heights up to 18 feet, and can cause extensive damage to structures. As Table 8 at right shows, the frequency of Louisiana experiencing a category 4 hurricane is 70 years.

Maps 4 and 5 depicts sea, lake, and overland surges from hurricanes (SLOSH) models run to identify areas of southern Louisiana that can be affected by storm surge inundation in category 3 and category 5 hurricanes. SLOSH models represent the storm surge of hundreds of simulated hurricanes, taking into account storm wind intensities, forward speeds, directions of motion, and radius of maximum winds. The SLOSH models show that most places along the southern coastline and 100 miles inland can experience significant inundation depths. Category 3 storms

Table 8: Frequency of Hurricanes Passing Within 80 Miles of New Orleans, Louisiana

Intensity	Frequency
Category 1	8 years
Category 2	19 years
Category 3	32 years
Category 4	70 years
Category 5	180 years

Source: USGS, "Environmental Atlas of Lake Pontchartrain," <http://pubs.usgs.gov/of/2002/of02-206/phy-environment/>

can bring depths up to 24 feet as far north as the City of New Orleans. Category 5 storms can produce depths as high as 36 feet.

Hurricane impact can be even more severe when combined with the ongoing, but long-term phenomenon of coastal subsidence and the potential release of hazardous materials. Roads for evacuation routes are sinking and, in time, may be unusable in developed areas during coastal storms. Furthermore, flooding from storm surge can lead to damage to hazardous materials facilities in the “petrochemical industrial corridor” between New Orleans and Baton Rouge. Damaged pipelines or storage tanks can leak into storm waters and contaminate surface waters, soil and groundwater resources.

6.4 SOURCES OF INFORMATION

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7.1 NATURE OF THE HAZARD

In Louisiana, the two most important categories of land failure hazards are sea-level rise and land subsidence. Sea-level rise means exactly that – the level of the sea is rising relative to land at the coastline. The most prominent causes of sea-level rise are the melting of the Earth's glacial ice caps and sea floor spreading. Subsidence refers to the gradual settling or sinking of the Earth's surface due to removal or movement of subsurface earth materials. Some principal causes of subsidence are compaction, underground mining, removal of groundwater, sinkholes, and thawing permafrost. Both of these geologic processes impact Louisiana in a similar manner, making it difficult to separate the effects of one from the other.

The primary causes of subsidence in coastal Louisiana areas are the isostatic adjustment of land due to Mississippi River sediment-loading and the localized compaction of older sediments. The term "isostatic adjustment" refers to the attempts of the Earth's crust to maintain equilibrium. In this case, large amounts of sediment are being deposited by the Mississippi River in a relatively short amount of time, causing the crust to compensate for the extra weight of the sediment. Tables 9 and 10 compare subsidence rates (mean annual subsidence [mm/yr]) based on geologic conditions and soils in Louisiana coastal areas. As shown on the tables, geology and soil types do not have much effect on subsidence rates. Other causes like human occupancy, buildings and infrastructure, oil and gas extraction, and lowering of the water due to groundwater extraction have much more of an effect. Human acceleration of natural processes through levying rivers, draining wetlands, dredging channels, and cutting canals through marshes only exacerbates the subsidence problem.

Table 9: Mean Annual Subsidence Coded by Geology, 1985-1991

Class	Mean Annual Subsidence (mm/yr)	Std. Dev.
Natural Levee Deposits	-9.37	3.36
Alluvial Soils	-8.57	2.36
Artificial Fill	-9.66	1.07
Lake Fringe Deposits	-9.49	2.18
Total	-9.16	2.98

Source: Hart and Zilkoski, 1994

Table 10: Mean Annual Subsidence Coded by Soils, 1985-1991

Class	Mean Annual Subsidence (mm/yr)	Std. Dev.
Sharkey-Commerce (natural levees)	-8.65	2.28
Clovelly-Lafitte-Gentilly (marsh and swamp)	-1.51	1.75
Harahan-westwego (drained marsh)	-9.35	5.45
Allemands/Kenner (drained marsh)	-8.46	2.64
Aquents (spoil)	-9.09	3.22
Total	-8.42	3.65

Source: Hart and Zilkoski, 1994

7.2 DISASTER HISTORY

Sea-level rise and land subsidence have not been identified as significant contributors to direct disaster damages in Louisiana. For the most part, sea-level rise and subsidence are two processes that are slow acting, so their effects are not as evident as sudden-occurrence hazards like earthquakes. While the effects in the New Orleans metropolitan area are significant, subsidence is a “creeping” hazard event, one with chronic, not acute impacts. The only hazard to be documented as a direct result of subsidence is the appearance of sinkholes over a mining operation in Weeks Island. The repeated removal of underground materials (originally salt and later oil) resulted in the formation of a sinkhole in 1992. The Weeks Island facility was decommissioned as a result of this discovery.

7.3 RATE OF OCCURRENCE

Subsidence is already occurring throughout much of coastal Louisiana. An acre of land along the coast disappears every 24 minutes. The highest rate of subsidence is occurring at the Mississippi River delta (3.5 feet/century). Subsidence rates decrease away from the delta in a northeast, northwest, and western direction.

As for sea-level rise, the USGS and the EPA have each developed their own estimates. The USGS estimates that the rate of sea-level rise in Louisiana is approximately 3.0 feet/century and the EPA estimates that it is approximately 3.4 feet/century. There is little to suggest that these processes will cease to occur in the future, indeed rates may increase due to the naturally occurring sediment deposition and rise in sea-level, which contributes to marsh decline and land loss. Further north, continued development and drainage improvements exacerbate the situation.

Because it is difficult to separate the effects of subsidence and sea-level rise, a new approach to categorizing the hazard represented by sea-level rise has been developed. Coastal vulnerability describes the loss of coastal lands due to sea-level rise. It is expressed in terms of a coastal vulnerability index (CVI). The CVI is determined by six separate factors: rate of sea-level rise, coastal erosion, wave height, tidal characteristics, regional coastal slope, and coastal geomorphology (see Appendix E for figures depicting each of these individual characteristics). Map 8 shows the overall CVI risk. The CVI for the Louisiana coast is high to very high. Some portion of the Louisiana coast ranked very high for every factor with the exception of wave height. The main factors responsible for the high ranking, however, are geomorphology, coastal slope, and rate of relative sea-level rise.

Map 8: Louisiana Coastal Vulnerability Index

7.4 SEVERITY

Increased rates of subsidence and sea-level rise can have an effect on structures, infrastructure, and the coastal ecology, namely:

- Foundation failures for residential and commercial buildings, roads, bridges, and sidewalks;
- Structural failures of underground utilities, sometimes resulting in natural gas pipeline explosions, levees, railroad embankments, etc.;
- Saltwater intrusion or submergence destroying wetland vegetation, which promotes erosion;
- Hurricane and storm protection structures being impacted directly over the long-term by increased loading from building higher structures;
- Relocation of infrastructure – roads, utility lines, etc.; and
- Increased susceptibility of the coast to storm surge.

Perhaps the most significant secondary hazard associated with subsidence and sea-level rise is increased intensity of storm surge, areas increasing the risk of flooding, even after minor storms, especially for cities like New Orleans, which already lies below sea-level. This, in combination with the ongoing disappearance of delta marshes, leaves New Orleans with an increasing probability of more severe flood impacts.

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8.1 NATURE OF THE HAZARD

Winter months in Louisiana (December, January, and February) have average seasonal temperatures ranging from the mid-40s over northern Louisiana to the low 50s across southern parishes. While average seasonal temperatures remain above freezing Statewide, cold fronts extending from Canada through the State occur at least once during most winters. Severe winter weather in Louisiana consists of freezing temperatures and heavy precipitation, usually in the form of rain, freezing rain, or sleet, but sometimes in the form of snow. Severe winter weather affects all but the extreme coastal margins of the State.

Because severe winter storm events are relatively rare in Louisiana, compared to more northern states where winter events are expected and states tend to be better equipped to handle them, occurrences tend to be very disruptive to transportation and commerce. Trees, cars, roads, and other surfaces develop a coating or glaze of ice, making even small accumulations of ice extremely hazardous to motorists and pedestrians. The most prevalent impacts of heavy accumulations of ice are slippery roads and walkways that lead to vehicle and pedestrian accidents; collapsed roofs from fallen trees and limbs and heavy ice and snow loads; and felled trees, telephone poles and lines, electrical wires, and communication towers. As a result of severe ice storms, telecommunications and power can be disrupted for days.

8.2 DISASTER HISTORY

Louisiana has had several overwhelming bouts of winter weather recently. In February 1994, a severe ice storm spread freezing rain across the northern third of the State. Ice accumulations 2 to 3 inches thick combined with gusty winds snapped power lines, power poles, and trees. Over 100,000 people were without electrical power for several days, and more than 256,000 acres of forest were damaged. The State suffered an estimated \$13.5 million in damages.

Ice storms within a 2-week period in December 2000 caused similar damage, causing over 250,000 people to be without power, primarily in north Louisiana. About 30 transmission lines atop “H”-shaped steel towers were snapped due to the weight of the ice, and numerous traffic accidents occurred across the State. With millions of dollars in damages and one death attributed to the storms, the State received a presidential disaster declaration.

8.3 PROBABILITY OF OCCURRENCE AND SEVERITY

While Louisiana is far less likely to have heavy snow and ice accumulation than most other states in the U.S., severe winter weather is expected to occur at least once each winter. Data from the National Climatic Data Center (NCDC) shows that the entire state of Louisiana is in the lowest category of probable snow depth—0 to 25 centimeters of snow depth with a 5% chance of being equaled or exceeded in any given year. Louisiana ice storms that have had severe consequences for the State have generally delivered between 1 and 3 inches of ice accumulation.

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9.1 NATURE OF THE HAZARD

Tornadoes are rapidly rotating funnels of wind extending from storm clouds to the ground. They are created during severe weather events like thunderstorms and hurricanes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. The midsection of the United States, including Louisiana, experiences a higher rate of tornadoes than other parts of the country because of the recurrent collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains.

Tornadoes are the most hazardous when they occur in populated areas. Tornadoes can topple mobile homes, lift cars, snap trees, and turn objects into destructive missiles. Among the most unpredictable of weather phenomena, tornadoes can occur at any time of day, in any state in the union, and in any season. In Louisiana, tornadoes have higher frequency in the spring months of March, April, and May. While the majority of tornadoes cause little or no damage, some are capable of tremendous destruction, reaching wind speeds of 250 mph or more.

9.2 DISASTER HISTORY

Figure 5 shows past tornado occurrences across the State of Louisiana from 1950 to 1966. While the vast majority of tornado events in Louisiana have produced little damage and few injuries, the State has experienced several violent and fatal tornado outbreaks. In fact, the State of Louisiana has had six federal disaster declarations for tornado events since 1965. According to NOAA, one of the deadliest tornado outbreaks in U.S. history occurred in Louisiana and neighboring states during April 24-26, 1908. A number of violent tornadoes moved through parts of Louisiana, Mississippi and Alabama, killing 324 people and injuring 1,652 others. The worst damage took place in Amite, Louisiana, where 29 people died.

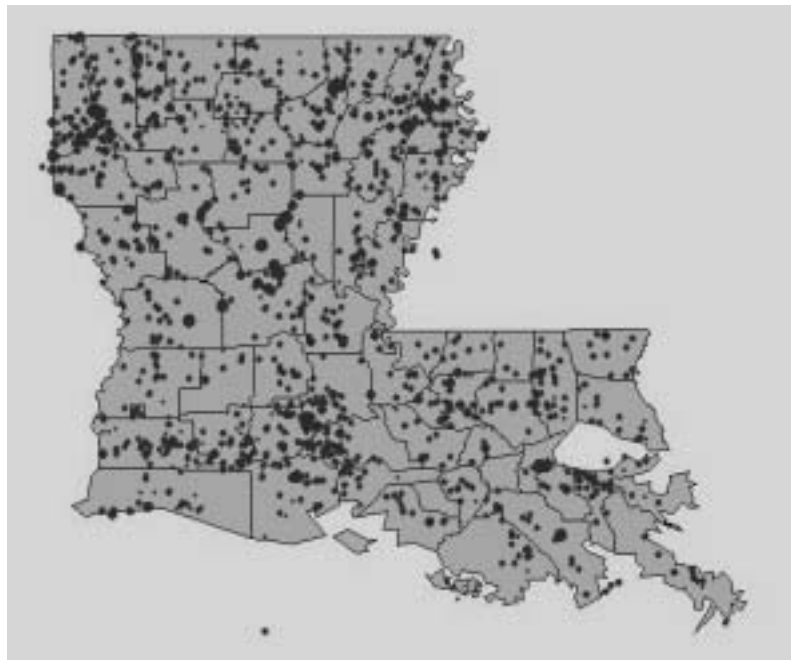


Figure 5: Past Louisiana Tornado Events, 1950 to 1966 (University of Louisiana).

More recently, disaster struck the parishes of Bossier, Caddo, Claiborne, and Desoto in the early evening of April 3, 1999. Several F3 and F4 tornadoes touched down, killing seven people,

injuring 103 others, and causing over \$12 million in damages, warranting a presidential disaster declaration.

9.3 FREQUENCY OF OCCURRENCE AND INTENSITY

Table 11 lists the top states in the nation for number of tornadoes, fatalities and injuries caused by tornado events, and accumulated dollar damages (adjusted for inflation by the consumer price index). Louisiana ranks within the top 20 states in the nation for all four categories, indicating that it has a relatively high likelihood for occurrences and damages.

Table 11: Top 20 States for Number of Tornadoes, Fatalities, Injuries, and Damages, 1950 to 1994

Tornadoes			Fatalities			Injuries			CPI adjusted dollars		
Rank	State	Number	Rank	State	Number	Rank	State	Number	Rank	State	Number
1	Texas	5490	1	Texas	475	1	Texas	7452	1	Texas	\$1,955,927,552
2	Oklahoma	2300	2	Mississippi	386	2	Mississippi	5344	2	Indiana	\$1,648,654,336
3	Kansas	2110	3	Arkansas	279	3	Alabama	4483	3	Kansas	\$1,212,980,480
4	Florida	2009	4	Alabama	275	4	Ohio	4156	4	Georgia	\$1,117,426,176
5	Nebraska	1673	5	Michigan	237	5	Arkansas	3697	5	Oklahoma	\$1,065,659,392
6	Iowa	1374	6	Indiana	218	6	Indiana	3641	6	Minnesota	\$1,015,354,624
7	Missouri	1166	7	Oklahoma	217	7	Illinois	3599	7	Ohio	\$965,464,832
8	South Dakota	1139	8	Kansas	199	8	Michigan	3214	8	Illinois	\$823,819,264
9	Illinois	1137	9	Illinois	182	9	Oklahoma	3184	9	Missouri	\$739,382,784
10	Colorado	1113	10	Tennessee	181	10	Georgia	2662	10	Iowa	\$709,211,904
11	Louisiana	1086	11	Ohio	173	11	Florida	2594	11	Nebraska	\$632,463,872
12	Mississippi	1039	12	Missouri	155	12	Tennessee	2592	12	Massachusetts	\$617,793,280
13	Georgia	888	13	Louisiana	134	13	Kentucky	2333	13	Pennsylvania	\$615,033,088
14	Alabama	886	14	Georgia	111	14	Kansas	2267	14	Alabama	\$609,664,768
15	Indiana	886	15	Kentucky	105	15	Missouri	2252	15	Louisiana	\$593,237,248
16	Arkansas	854	16	Massachusetts	99	16	Louisiana	2169	16	Mississippi	\$541,601,536
17	Wisconsin	844	17	Wisconsin	94	17	North Carolina	1778	17	Arkansas	\$516,939,264
18	Minnesota	832	18	Minnesota	87	18	Iowa	1774	18	Florida	\$498,256,384
19	North Dakota	799	19	Florida	82	19	Minnesota	1707	19	Wisconsin	\$410,756,864
20	Michigan	712	20	North Carolina	81	20	Wisconsin	1442	20	Connecticut	\$385,388,800

Source: Storm Prediction Center, National Oceanographic and Atmospheric Administration, www.spc.noaa.gov/archive/tornadoes/st-rank.html

Tornado intensity is measured by the Fujita Tornado Scale. The Fujita Tornado Measurement Scale, shown in Table 12, determines likely wind speeds based on the severity of tornado damage and assigns a scale category, F0 through F5. The table below shows the tornado category, corresponding wind speed, types of damage possible, and the number of tornadoes per

category that Louisiana has experienced between 1950 and 2002. Tornado occurrence and intensities by parish can be found in Appendix F.

Table 12: Fujita Tornado Measurement Scale and Frequencies in Louisiana

Category	Wind Speed	Examples of Possible Damage	Number in Louisiana	% of LA Tornadoes
F0	Gale (40-72 mph)	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.	321	22%
F1	Moderate (73-112 mph)	Moderate damage. Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.	698	48%
F2	Significant (113-157 mph)	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.	292	20%
F3	Severe (158-206 mph)	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.	132	9%
F4	Devastating (207-260 mph)	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	18	1%
F5	Incredible (261-318 mph)	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked; incredible phenomena will occur.	2	0.1%
Total tornadoes in Louisiana, 1950-2002			1463	

Source: Storm Event Database. National Climatic Data Center, National Oceanic and Atmospheric Administration.
<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms>.

The history of tornadoes from 1950 to 2002 shows that Louisiana averages 24-29 tornadoes a year. The majority of reported tornadoes (1019, about 70%) have been at the F0 to F1 levels.

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10.1 NATURE OF THE HAZARD

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires.

Wildfires can be caused through human acts like arson or careless accidents, or through natural occurrences of lightning. Wildfire danger can vary greatly season to season and is exacerbated by dry weather conditions. According to the State of Louisiana Forestry Division, most forest fires in Louisiana are caused by arson and other careless acts by people.

The urban-wildland interface is an area in which development meets wildland vegetation. Both vegetation and the built environment provide fuel for fires. As development near wildland settings continues, more and more people are being exposed to wildfire danger.

According to the State Forestry Division, Louisiana's forestlands cover 48% or 13.8 million acres of the State's area. Private, non-industrial landowners own 62% of the State's forestland, forest products industries own 29%, and public entities own 9%. Forests provides the raw material for Louisiana's second largest manufacturing employer - the forest products industry - with over 900 firms in 45 parishes employing more than 25,000 people. An additional 8,000 people are employed in the harvesting and transportation of the resource. Louisiana's forests provide a multitude of other benefits, including clean air and water, wildlife habitat, recreational opportunities and scenic beauty. The loss from wildfire is potentially catastrophic. In addition to the destruction of valuable forestland and the impacts on the economy through the loss of this important resource, wildfires seriously threaten countless rural structures, human lives, and wildlife.

10.2 FREQUENCY OF OCCURRENCE

Table 13 shows that from 2000 to 2002, the average number of forest fires was 2,418 per year, and the average number of acres burned was 37,761. Because most fires in Louisiana forests are caused by arson and other careless acts by people, the location and severity of fires is largely unpredictable.

Table 13: Forest Fires and Acres Burned

Year	Total Fires	Total Acres Burned
2000	4738	92,573
2001	1090	7,800
2002	1425	12,909
Average	2418	37,761
Grand Total	7253	113,282

Source: Forestry Division, Louisiana Department of Agriculture and Forestry. <http://www.ldaf.state.la.us/divisions/forestry/forestprotection/wildfire/search.asp>

10.3 MAGNITUDE

Table 14 shows the number of acres burned in recent years by month. This table and Table 13 above indicate that the number of wildfires and their magnitudes in terms of acres burned can vary greatly. In dry and drought conditions, wildfires can become quite intense, burning dead forest debris on forest floors, dried grasses and brush.

Table 14: Total Acres Burned by Month and Year

Month	Year			Grand Total	Avg. by Month
	2000	2001	2002		
January	8,298	398	1,281	9,977	3,326
February	14,111	1,656	3,496	19,263	6,421
March	6,337	822	2,720	9,879	3,293
April	2,041	1,608	737	4,386	1,462
May	1,549	1,627	1,200	4,376	1,459
June	1,109	122	831	2,062	687
July	1,803	203	299	2,305	768
August	12,631	298	939	13,868	4,623
September	41,786	34	970	42,790	14,263
October	2,427	367	55	2,849	950
November	249	617	136	1,002	334
December	234	48	245	527	176
Grand Total	92,575	7,800	12,909	113,284	37,761

Source: Forestry Division, Louisiana Department of Agriculture and Forestry.
<http://www.ldaf.state.la.us/divisions/forestry/forestprotection/wildfire/search.asp>

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11.1 NATURE OF THE HAZARD

Dams are water storage, control, or diversion barriers that impound water upstream in reservoirs. Dam failure is a collapse or breach in the structure. While most dams have storage volumes small enough that failures have little or no repercussions, dams with large storage amounts can cause significant flooding downstream.

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which cause most failures;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway;
- Landslides into reservoirs, which cause surges that result in overtopping;
- High winds, which can cause significant wave action and result in substantial erosion; and
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments, that can weaken entire structures.

In Louisiana there are 365 dams included in the United States Army Corps of Engineer's National Inventory of Dams which records dams in the high or significant hazard potential class, low hazard potential class dams that exceed 25 feet in height and 15-acre-feet of storage, and low hazard potential class dams that exceed 50-acre-feet of storage and 6 feet in height (see "Probability of Occurrence and Severity" on the following page for definitions of high, significant, and low hazard potential).

Levees are flood control barriers constructed of earth, concrete, or other materials. Levee failure involves the overtopping, breach, or collapse of the levee. Levee failure is especially destructive to nearby development during flood and hurricane events. The northern half of Louisiana is protected by levees on the Ouachita River under the authority of the Vicksburg District of the United States Army Corps of Engineers (USACE). Coastal and southern Louisiana is protected by an extensive levee system. The New Orleans District of the USACE is responsible for 30,000

square miles of Louisiana south of Alexandria, including 961 miles of river levees in the Mississippi River and Tributaries Project, 449 miles of river levees in the Atchafalaya Basin, and 340 miles of hurricane-protection levees. Appendix G contains a graphic of hurricane levee districts in the USACE New Orleans District.

11.2 DISASTER HISTORY

While there are no reports of significant dam failures in Louisiana, the National Performance of Dams Program, a database of dam incidents (events that affect the structural and functional integrity of dams, though not necessarily causing failure and not including ordinary maintenance and repair, vandalism, acts of war, recreational accidents, and sabotage) maintained by Stanford University, lists one incident from the fall of 1985. Park managers at the Cotile Lake Dam/Reservoir in Rapides Parish reported seepage due to sand and gravel deposits that displaced concrete slabs. There was no dam failure or controlled breach reported in this incident.

Levees have been overtopped or breached during flood events and non-flood events. A section of levee along the Mississippi River near Marrero, Louisiana, failed in a non-flood-related event. The causes of levee failure included scouring and erosion of sand from the toe of the river bank, which create an over-steepened slope and resultant instability of the upper bank. Severe scour at the toe resulted as the channel bottom deepened through the sandy substratum. Flow failure in the sands then led to loss of the upper bank. Thus, the location of the failure was controlled by the nature of the geologic deposits beneath the levee, combined with progressive deepening of the river channel at that location.

11.3 SEVERITY

The amount of water impounded, and the density, type, and value of development downstream determine the potential severity of dam failure. High hazard dams are dams where failure or improper operation will probably cause loss of human life. Significant hazard dams are those where failure or improper operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure. Low hazard potential dams are those where failure or improper operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property. In Louisiana, there are 15 high hazard, 63 significant hazard, and 287 low hazard potential dams. As shown in Table 15, only seven dams have emergency action plans (one dam is located in Texas).

Table 15: Dams with Emergency Action Plans by Hazard Potential

County	Dam Name	H	S	L
Bossier	Bayou Bodcau Dam	●		
Caddo	Caddo Dam		●	
Caddo	Wallace Lake Dam	●		
Concordia	Old River	●		
E Baton Rouge	Pennington Lake Dam	●		
Rapides	Conference Center Lake Dam			●
Sabine-La Newton-Tx	Toledo Bend	●		
Total		5	1	1

Similarly, the severity of levee breaches depends upon the amount of nearby development. While levees in the New Orleans District are regularly maintained by the USACE to prevent breaches, the very existence of levees can present a danger to metropolitan New Orleans. Levee construction by the USACE has encouraged the city and its industries to drain marshland protected by the levees. As drainage lowered the water table allowing the top layers of muck (wet peat) to dry, consolidate, and subside, New Orleans has sunk below sea level. Some engineers theorize that a large-scale hurricane that hits just east of the city can overtop levees, trap water within their walls, and inundate the city under more than 20 feet of water.

11.4 SOURCES OF INFORMATION

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12.1 NATURE OF THE HAZARD

Hazardous materials hazards are technological (meaning non-natural hazards created or influenced by humans) events that involve large-scale accidental or intentional releases of chemical, biological, or radiological (nuclear) materials. Hazardous materials events generally involve incidents at fixed-site facilities that manufacture, store, process, or otherwise handle hazardous materials or along transportation routes like major highways, railways, navigable waterways, and pipelines.

Many know southern Louisiana between New Orleans and Baton Rouge as the “chemical corridor” because of its heavy concentration of petrochemical manufacturing facilities sited along highways, railways, and navigable waterways. As of 2000, the State of Louisiana had 369 fixed-site facilities that filed Toxic Release Inventory reports with the Environmental Protection Agency, the agency that monitors the manufacture, disposal, transportation, and releases of hazardous materials (Map 9, using 1996 HAZUS data, depicts 243 of these facilities). Louisiana ranked 11th in the nation for the number of pounds of on- and off-site releases from these facilities (154,522,635 pounds) and first in the nation for the number of pounds of production-related waste managed (9,416,598,055 pounds). Appendix H contains the EPA’s 2000 Louisiana State Toxic Release Inventory report, which summarizes the reported releases and waste management activities for the state, the top five chemicals released in the state, and the top ten facilities for releases. Furthermore, Map 9 shows 2,738 miles of state and federal highways, 2,273 miles of navigable waterways, and 4,579 miles of railways that can potentially carry hazardous materials around the State.

The U.S. Environmental Protection Agency, which monitors hazardous materials facilities, requires Risk Management Programs (RMP) for companies of all sizes that use certain flammable and toxic substances. The programs must consist of risk management plans that include hazard assessments that detail the potential effects of accidental releases including the numbers of affected households, accident histories of the last five years, and evaluations of worst-case and alternative accidental releases. The information helps local fire, police, and emergency hazardous materials response personnel respond effectively to emergencies. Within Louisiana, there are 360 facilities that have submitted RMP plans.

In addition to chemical production facilities, there are three nuclear facilities with Emergency Planning Zones - the 10-mile Critical Risk Zone and the 50-mile Ingestion Pathway Zone - that include parts of the State of Louisiana. Map 9 shows the Grand Gulf Nuclear facility, located in Mississippi, and the River Bend and W-3 nuclear facilities within the Louisiana state boundaries. Areas within the Critical Risk zone are at risk from immediate exposure to accidental radiological releases, and those within the Ingestion Pathway Zone are at risk from air- or water-borne contamination.

Nuclear accidents are classified in three categories:

- Criticality accidents involving nuclear assemblies, research, production, or power reactors, and chemical operators.

- Loss-of-coolant accidents resulting from significant breaks in the reactor coolant system.
- Loss-of-containment accidents involving the release of radioactivity through breaches in containment vessels at fixed facilities or damage to packages in transportation accidents.

12.2 DISASTER HISTORY

While the State has thousands of accidental releases each year, most damaging effects are limited by the insignificant size of the accident and the timeliness of appropriate emergency response. However, some spills and other accidental releases have been of a size sufficient enough to present a danger to nearby populations or the environment. In October 1995, a railroad tank car holding rocket fuel (nitrogen tetroxide) exploded at the Gaylord Chemical plant in Bogalusa, Louisiana, releasing a mushroom cloud of poisonous gas. The explosion occurred after weeks of nitrogen tetroxide vapor leaks from faulty valves on a railroad tank car. The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was the lack of adequate procedures to prevent or detect the contamination of nitrogen tetroxide with water used by employees to dilute the chemical during transfer from the faulty tank car to another. The contamination formed an extremely corrosive product that led to the failure of the tank car. The accident resulted in the evacuation of 3,000 people, injuries to 4,700, and hospitalization of 81.



Figure 6: Pyrolysis gasoline spill near Baton Rouge, March 1997. Louisiana Department of Environmental Quality.

Another hazardous materials incident involved a large gasoline spill in March 1997 that required concentrated local and state response efforts and generated much media attention. In Baton Rouge, a 25-barge tow being pushed by a tug boat struck the U.S. Highway 190 bridge over the Mississippi River. The tow separated, sinking two barges and capsizing a tank barge. The capsized barge began leaking some of the 10,000 barrels of pyrolysis gasoline, leading to concerns about benzene fumes and

the evacuation of 24 nearby schools, a university, and nearby homes and offices in downtown Baton Rouge. Several citizens sought medical attention after being affected by the heavy fumes. Extensive monitoring of the ambient air and water continued for 12 days, until the barge was transported nearly 50 miles downstream for final lightering.

The May 2000 derailment of an eastbound Union Pacific Railroad train released hazardous materials that led to the evacuation of 3,500 people near Eunice, Louisiana and damages exceeding \$35 million. Of 113 cars, 33 derailed, 15 of which contained hazardous materials. The NTSB determined that the probable cause of the derailment was the failure of a set of defective joint bars on the tracks.

Map 9: Louisiana Hazardous Materials Planning Zones.

12.3 FREQUENCY OF OCCURRENCE

On average, the State of Louisiana receives about 5,000 reports of accidental hazardous materials spills annually. Most accidental releases have occurred while chemicals were being transported along major highways. Table 16 presents the number of hazardous materials spills and complaints reported to the Louisiana Department of Environmental Quality by month for 2000 through 2002.

Table 16: Louisiana Hazardous Materials Complaints and Spills by Month, 2000-2002.

Month	2000		2001		2002	
	Complaints	Spills	Complaints	Spills	Complaints	Spills
January	234	453	229	500	336	398
February	301	435	240	372	356	394
March	303	503	385	379	371	386
April	328	389	374	393	391	386
May	360	458	411	434	371	400
June	295	465	337	572	293	367
July	282	356	303	421	339	419
August	295	403	311	421	365	350
September	241	403	293	404	313	419
October	315	353	432	474	379	532
November	226	387	348	387	237	363
December	192	390	272	333	220	403
Total for the Year	3372	4995	3935	5029	3971	4817

Source: Louisiana Department of Environmental Quality,
<http://www.deq.state.la.us/surveillance/emergresp/complaintspillcount.htm>

12.4 SEVERITY

The severity of a hazardous materials release depends upon the type of material released, the amount of the release, the proximity to populations or sensitive areas like wetlands or waterways. As previous hazardous materials incidents in Louisiana have shown, the release of materials can lead to injuries or evacuation of thousands of nearby residents. Nuclear releases are among the most feared of technological hazards because they can cause widespread death or long-term illness to humans and animals and contaminate the environment for decades.

Because the state's "chemical corridor"-- the intense concentration of petrochemical plants--lies along transportation routes between New Orleans and Baton Rouge in southern Louisiana, scientists and other hazard analysts theorize that hurricane winds, storm surge, or flooding could lead to an accidental release of a hazardous material from a fixed-site or from a transport mode on one of the highways, railroads, or waterways. A professor for the Institute for Environmental Studies at Louisiana State University theorizes that airborne debris could breach pipes or tanks, floods could break tanks away from facilities, and pipelines could be ruptured by floating debris.

Such releases can lead to widespread contamination of Louisiana's coastline and to inland areas, explosions and fire, and death or injury to humans, plants, and animals.

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13.1 NATURE OF THE HAZARD

Natural biohazards involve the rapid spread of serious, infectious diseases to humans, and can involve acute and chronic infection, parasitism, and toxic and allergic reactions to plant and animal agents. Diseases are transmitted to humans in many different ways. Many diseases are communicable directly from animal to humans, and some infectious or parasitic diseases are transmitted by parasitic arthropod species (including insects and crustaceans) that act as intermediate hosts or animal carriers. Furthermore, a spectrum of plants and animals produce irritating, toxic, or allergenic substances. Dusts may contain many kinds of allergenic materials, including insect scale, hairs, fecal dust, sawdust, plant pollens, and fungal spores. Some occupations are more likely to expose the worker to natural biohazards, including:

- Plant or animal handlers or those whose jobs cause them to come into contact with animal products;
- Laboratory employees;
- Hospital personnel;
- Employees working with food and/or food processing; and,
- Previously unexposed and susceptible individuals who travel and/or work in new environments that may increase their risk of contracting endemic diseases.

Natural biohazards become emergency management matters when they exceed the ability of regular health care systems to respond to outbreaks. These situations require the mobilization of other agencies to prevent further spread of the disease or to respond to the consequences of the disease (e.g., handling mass casualties, preventing fear or out-migration of populations, or enforcing quarantine policies). The level of response to outbreaks depends upon the nature of the disease, the available resources of affected jurisdictions including their health care systems, and often demographics and natural environment in the affected area. For example, diseases such as West Nile or dengue that are spread to humans by mosquitoes can be effectively managed by health care workers in parishes in which vigorous mosquito control programs are in place. However, parishes without established programs require the aid of other agencies in order to implement emergency remedial mosquito control programs to help prevent the spread of the virus. As another example, health care workers consider rabies, a virus primarily found in wildlife, to be a threat to human populations only when dogs, livestock, or other domestic animals are infected with the disease. Even one case of rabies in a domestic animal near concentrations of human population may require a coordinated response from non-health care agencies, like police departments and veterinarians, to track down other potential cases and to warn humans that may have come in contact with infected animals.

The Louisiana Office of Public Health in the Department of Health and Hospitals tracks a number of infectious diseases. Table 17 lists communicable diseases reportable by health care workers in Louisiana. These diseases are actively tracked epidemiologically and have active prevention programs.

Table 17: Reportable Communicable Diseases in Louisiana, 1998.

Acquired Immune Deficiency Syndrome (AIDS)	Lymphogranuloma venereum
Amebiasis	Malaria
Arthropod-borne encephalitis	Measles (rubeola)
Blastomycosis	Meningitis, other bacterial or fungal
Botulism	Mumps
Campylobacteriosis	Mycobacteriosis, atypical
Chancroid	Neisseria meningitidis infection
Chlamydial infection	Pertussis
Cholera	Rabies (animal & man)
Cryptosporidiosis	Rocky Mountain Spotted Fever (RMSF)
Diphtheria	Rubella (congenital syndrome)
Enterococcus (infection; resistant to vancomycin)	Rubella (German measles)
Escherichia coli 0157:H7 infection	Salmonellosis
Gonorrhea	Shigellosis
Haemophilus influenzae infection	Staphylococcus aureus (infection; resistant to methicillin/oxacillin or vancomycin)
Hemolytic-Uremic Syndrome	Streptococcus pneumoniae (infection; resistant to penicillin)
Hepatitis B carriage in pregnancy	Syphilis
Hepatitis, Acute (A, B, C, Other)	Tetanus
Herpes (neonatal)	Tuberculosis
Human Immunodeficiency Virus (HIV) infection	Typhoid fever
Legionellosis	Varicella (chickenpox)
Lyme Disease	Vibrio infections (excluding cholera)

Source: Reportable Communicable Diseases, Louisiana Office of Public Health, Department of Health and Hospitals

Louisiana public health officials also track emerging diseases like West Nile and severe acute respiratory syndrome (SARS). West Nile virus, which has only been evident in the United States since 1999, is a mosquito-borne pathogen that can cause encephalitis or brain infection and occurs in the late summer or early fall. Mosquitoes acquire the virus from birds and pass it on to other birds, animals, and humans. On the other hand, SARS, a flu-like viral disease that emerged in 2003, has spread throughout the world by travelers in close contact with infected people. The disease, which first emerged in Asia, has infected nearly 2800 people worldwide (as of April 10, 2003) and 154 people in the United States. No cases have been reported in Louisiana.

13.2 DISASTER HISTORY

Before the turn of the 20th century, Louisiana had several serious bouts of disease epidemics. Throughout much of the eighteenth and nineteenth centuries, Louisiana had the highest death rate of any state due to disease, and New Orleans had the highest death rate of any city. Four epidemics broke out between 1851 and 1855, killing 73 out of every 1000 people in New Orleans. The high disease and death rates in Louisiana and especially New Orleans stemmed not only from the semi-tropical climate and unsanitary conditions, but also from the cross-cultural

exchange of germs among native populations and immigrants from Europe, Africa, and the Caribbean. Diseases from Europe decimated native populations, and diseases from Africa devastated European settlers. Of 6,700 immigrants who arrived between 1717 and 1721 from France, about 2,000 died from malaria, yellow fever, and dysentery soon after arriving in Louisiana.

Diseases that troubled Louisiana included yellow fever, smallpox, cholera, dysentery, malaria, mange, scurvy, yaws, Hansen's disease, and venereal diseases. The most serious epidemics developed from yellow fever, cholera, malaria and smallpox. Yellow fever, a disease with origins in Africa, was the most deadly, especially to Europeans, and killed as much as 60 percent of those who contracted the disease. In 1853, the worst epidemic year, 8000 people -- 1 out of every 15—died of yellow fever in New Orleans. The last major yellow fever epidemic in Louisiana occurred in 1905, five years after scientists discovered that mosquitoes carried the disease.

While epidemics the size and scope of the yellow fever epidemics of the eighteenth and nineteenth centuries are unlikely today, Louisiana experienced in recent decades the impact of several emergent diseases, particularly West Nile virus. According to the Centers for Disease Control and Prevention (CDC), in 2002, Louisiana had 330 cases of laboratory-positive human cases and of West Nile Virus and 24 deaths from the disease, making Louisiana the 4th leading state in the nation for cases and for deaths. Map 10 shows the spread of the virus around the State in 2002.

13.3 RATE OF OCCURRENCE AND SEVERITY

Some medical professionals consider the human toll of the West Nile virus to be an epidemic. An “epidemic” is defined as a disease that occurs suddenly in numbers clearly in excess of normal expectancy, especially infectious diseases, but is applied also to any disease, injury, or other health-related event occurring in such outbreaks.

People over 50 years of age and people with compromised immune systems have the highest risk of developing a severe illness from the virus. Most people who are infected with West Nile virus have no symptoms or have an infection similar to a mild flu with fever, headache, and fatigue. Most cases of West Nile are treated in humans before the humans develop encephalitis, a serious illness of the brain. The death rate for humans who develop encephalitis ranges from 3 to 15 percent.

A global pandemic of dengue began in Southeast Asia after World War II and has intensified during the last 15 years (Figure 7 depicts the global reach of dengue). Risk factors for dengue hemorrhagic fever include age, immune status, and genetic predisposition of the patient. Currently, there is no vaccine for dengue, and the recent trend of increased epidemic activity is expected to continue. There is a small, but significant risk for dengue outbreaks in the continental United States, especially the southeast, including Louisiana. From 1977 to 1994, 481 confirmed cases of dengue were reported nationwide.

For both dengue and West Nile, mosquito control is the primary disease prevention method.

Map 10: West Nile Human Cases, 2002

World Distribution of Dengue - 2000

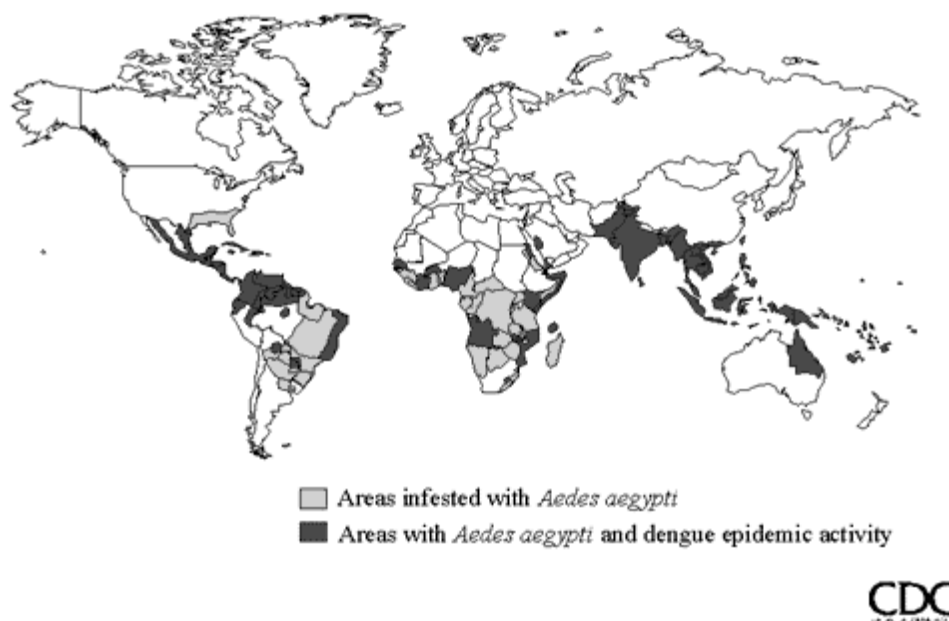


Figure 7: World Distribution of Dengue, CDC - 2000.

There are several other types of infectious diseases that the Louisiana Office of Public Health tracks that are transmitted by insects, similar to West Nile and dengue. Table 18, "Other Infectious Diseases," presents the type and number of cases found in 1997, 1998, and 1999. Furthermore, Appendix I contains the complete list of the numbers of reportable disease cases for the years 1970 to 1999.

Table 18: Other Infectious Diseases in Louisiana, 1997-1999

Disease	1997		1998		1999	
	Number	Rate	Number	Rate	Number	Rate
Malaria	20	0.5 per 100,000	17	0.4 per 100,000	11	0.3 per 100,000
Lyme Disease	12	03. per 100,000	13	0.3	9	0.2 per 100,000
Encephalitis, Arthropod-borne (Human Eastern Equine Encephalitis)	4	N/A	1	N/A	2	N/A
Encephalitis, Arthropod-borne (St. Louis Encephalitis)	0		20	N/A	0	
Rabies in Humans	0		3	N/A	0	N/A
Rocky Mountain Spotted Fever	5	0.1 per 100,000	5	0.1 per 100,000	2	N/A

Source: Infectious Disease Epidemiology Annual Report, Louisiana Office of Public Health, Department of Health and Hospitals.

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World Health Organization. *Cumulative Number of Reported Probable1 Cases of Severe Acute Respiratory Syndrome (SARS)*. Available from World Wide Web:
http://www.who.int/csr/sarscountry/2003_04_10/en/.

Appendix A
Additional Earthquake Hazard Information

Appendix A
Additional Earthquake Hazard Information

Earthquakes Felt In and Around Louisiana					
Event	Date	Lat	Long	Depth (km)	Mag
Not depicted on map	1811-1812				
1	February 14, 1843	30.00	-90.00		
2	February 15, 1843	30.00	-90.00		
3	April 12, 1882	30.00	-90.00		
4	January 22, 1886	30.40	-92.00		
5	February 3, 1905	30.50	-91.10		
6	December 15, 1927	29.00	-89.40		3.9
7	July 28, 1929	29.00	-89.40		3.8
8	October 19, 1930	30.00	-91.00		4.2
9	December 2, 1940	33.00	-94.00		
10	June 28, 1941	32.40	-90.90		
11	September 20, 1947	31.90	-92.70		
12	November 6, 1958	30.00	-90.00		
13	November 19, 1958	30.30	-91.10		
14	October 15, 1959	29.60	-93.10		3.8
15	April 24, 1964	31.38	-93.81	1	3.7
16	April 24, 1964	31.30	-93.80		2.6
17	April 24, 1964	31.42	-93.81	5	3.7
18	April 24, 1964	31.38	-93.80	5	3.2
19	April 24, 1964	31.30	-93.80		2.6
20	April 24, 1964	31.48	-93.79	9	3.2
21	April 24, 1964	31.30	-93.80		2.9
22	April 24, 1964	31.30	-93.80		2.8
23	April 24, 1964	31.30	-93.80		2.6
24	April 25, 1964	31.30	-93.80		2.6
25	April 25, 1964	31.30	-93.80		2.9
26	April 25, 1964	31.30	-93.80		2.9
27	April 26, 1964	31.30	-93.80		2.7
28	April 26, 1964	31.55	-93.78	5	3.3
29	April 27, 1964	31.30	-93.80		3.2
30	April 28, 1964	31.30	-93.80		3.1
31	April 28, 1964	31.40	-93.82	6	3.4
32	April 28, 1964	31.30	-93.80		4.4

Earthquakes Felt In and Around Louisiana					
Event	Date	Lat	Long	Depth (km)	Mag
33	April 28, 1964	31.63	-93.80	14	4.4
34	April 30, 1964	31.50	-93.80		3
35	May 2, 1964	31.30	-93.80		3.3
36	May 3, 1964	31.30	-93.80		3
37	May 7, 1964	31.50	-93.80		3.2
38	August 16, 1964	31.40	-93.80		2.9
39	August 19, 1964	31.30	-93.80	2.7	
40	February 13, 1981	30.00	-91.80		
41	February 18, 1981	29.56	-91.46	5	3
42	October 16, 1983	30.24	-93.39	5	3.8
43	June 10, 1994	33.01	-92.67	5	3.2

Appendix B
Additional Flood Hazard Information

Appendix B
Additional Flood Hazard Information

Declared Flood Disasters by Parish, 1965-2001																							
Parish	27-Apr-73	23-Feb-74	9-Apr-75	31-Jan-77	2-May-77	9-May-78	20-Sep-78	2-May-79	25-Sep-79	9-Apr-80	21-May-80	11-Jan-83	20-Apr-83	31-Oct-84	16-Jun-89	28-Aug-89	19-Nov-89	15-Apr-91	29-Apr-91	2-Feb-93	8-May-95	5-Jun-01	Total
Acadia											•				•								2
Allen									•			•			•	•							4
Ascension	•			•	•			•					•							•	•	•	8
Assumption	•							•		•									•		•	•	6
Avoyelles	•		•	•									•						•				5
Beauregard												•			•	•		•	•			•	6
Bienville				•											•	•		•	•				5
Bossier				•												•		•	•				4
Caddo				•											•			•	•				4
Calcasieu									•		•	•			•	•							5
Caldwell	•	•	•	•								•			•				•				7
Cameron	•											•											2
Catahoula	•	•	•					•				•						•	•				7
Claiborne				•											•			•	•				4
Concordia	•	•	•																•				4
De Soto				•														•					2
East Baton Rouge	•				•			•					•			•				•		•	7
East Carroll	•																		•				2
East Feliciana				•	•								•		•							•	5
Evangeline												•											1
Franklin	•	•	•	•								•			•				•				7
Grant	•			•								•			•	•			•				6
Iberia	•													•								•	3
Iberville	•							•		•						•			•	•		•	7
Jackson															•				•				2
Jefferson	•					•				•			•				•				•	•	7
Jefferson Davis				•							•					•							3
La Salle	•	•	•	•				•				•			•				•				8
Lafayette				•	•						•			•		•				•		•	7
Lafourche	•			•						•								•	•		•	•	7
Lincoln				•								•			•				•				4
Livingston	•			•	•			•					•						•	•		•	8
Madison	•														•				•				3
Morehouse				•								•			•			•	•				5
Natchitoches				•								•			•	•		•	•				6
Orleans	•					•				•			•				•				•	•	7
Ouachita	•	•					•					•			•				•				6

Appendix B
Additional Flood Hazard Information

Declared Flood Disasters by Parish, 1965-2001																								
Parish	27-Apr-73	23-Feb-74	9-Apr-75	31-Jan-77	2-May-77	9-May-78	20-Sep-78	2-May-79	25-Sep-79	9-Apr-80	21-May-80	11-Jan-83	20-Apr-83	31-Oct-84	16-Jun-89	28-Aug-89	19-Nov-89	15-Apr-91	29-Apr-91	2-Feb-93	8-May-95	5-Jun-01	Total	
Plaquemines	•																						1	
Pointe Coupee	•			•				•			•		•			•						•	7	
Rapides	•		•	•					•			•				•		•	•				8	
Red River				•											•				•				3	
Richland	•			•			•					•			•				•				6	
Sabine				•											•	•							3	
St. Bernard	•					•				•			•								•	•	6	
St. Charles	•									•							•		•		•	•	6	
St. Helena				•																		•	2	
St. James	•																		•		•	•	4	
St. John the Baptist	•					•															•	•	4	
St. Landry	•				•										•	•							4	
St. Martin	•				•			•		•				•					•	•		•	8	
St. Mary	•									•									•			•	4	
St. Tammany	•			•				•		•			•						•	•	•	•	9	
Tangipahoa	•			•	•								•							•	•	•	7	
Tensas	•																		•				2	
Terrebonne	•									•								•	•		•	•	6	
Union				•								•			•				•				4	
Vermilion				•							•			•	•	•				•		•	7	
Vernon				•								•			•	•							4	
Washington	•			•						•			•									•	5	
Webster				•											•	•		•	•				5	
West Baton Rouge	•																					•	2	
West Carroll				•											•			•	•				4	
West Feliciana	•			•																		•	3	
Winn												•			•	•			•				4	
Total Parishes Declared	38	6	7	34	8	4	2	10	3	12	6	19	12	4	28	19	3	14	37	9	12	27	314	

Appendix C
Additional Hailstorm Hazard Information

Appendix C
Additional Hailstorm Hazard Information

Number of Hailstorms, Maximum and Average Hail Size by Parish, 1955 to 2002							
Location	Number of Storms	Maximum Hail Size	Average Hail Size	Location	Number of Storms	Maximum Hail Size	Average Hail Size
Acadia	15	1.75	1.40	Morehouse	66	2.75	1.21
Allen	26	2.75	1.19	Natchitoches	80	2.75	1.14
Ascension	9	3.00	1.56	Orleans	23	1.75	1.13
Assumption	7	1.75	1.46	Ouachita	82	3.00	1.29
Avoyelles	20	1.75	1.18	Plaquemines	10	2.00	1.53
Beauregard	38	2.00	1.16	Pointe Coupee	15	1.75	1.30
Bienville	63	2.75	1.23	Rapides	74	2.75	1.22
Bossier	132	4.50	1.33	Red River	40	2.75	1.24
Caddo	197	4.50	1.34	Richland	37	2.75	1.36
Calcasieu	70	2.75	1.15	Sabine	69	3.00	1.24
Caldwell	49	2.75	1.30	St. Bernard	9	1.75	1.31
Cameron	16	2.75	1.33	St. Charles	17	2.75	1.34
Catahoula	16	2.75	1.47	St. Helena	4	1.75	1.50
Claiborne	58	2.75	1.28	St. James	5	1.75	1.30
Concordia	15	4.50	1.57	St. John the Baptist	5	1.75	1.40
De Soto	93	4.50	1.21	St. Landry	15	2.00	1.34
East Baton Rouge	30	2.00	1.24	St. Martin	8	2.75	1.33
East Carroll	36	2.75	1.26	St. Mary	7	1.75	1.18
East Feliciana	6	1.75	1.40	St. Tammany	29	3.00	1.21
Evangeline	21	2.75	1.27	Tangipahoa	23	1.75	1.42
Franklin	52	2.75	1.30	Tensas	39	2.75	1.26
Grant	27	2.75	1.38	Terrebonne	10	1.75	1.28
Iberia	11	1.75	1.11	Union	57	2.00	1.32
Iberville	12	1.75	1.40	Vermilion	14	1.75	1.20
Jackson	50	2.75	1.29	Vernon	42	2.75	1.27
Jefferson	24	3.00	1.45	Washington	17	2.00	1.36
Jefferson Davis	18	1.75	1.04	Webster	100	2.75	1.28
La Salle	21	2.75	1.21	West Baton Rouge	8	1.75	1.38
Lafayette	26	2.00	1.45	West Carroll	33	2.00	1.28
Lafourche	17	1.75	1.19	West Feliciana	7	1.75	0.95
Lincoln	59	2.75	1.24	Winn	43	2.75	1.20
Livingston	22	1.75	1.30	Total/Max./Avg.	2289	4.50	1.27
Madison	45	2.75	1.23				
Source: NCDC, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms							

Appendix C
Additional Hailstorm Hazard Information

Probability of Hailstorms by Size of Hail Stone by Parish (48-year period)						
Parish	Hail Stone Size in Inches					Probability for All Hailstone Sizes
	0-.74	.75-.99	1-1.9	2-2.9	3.0+	
Acadia	0.00%	0.02%	0.06%	0.00%	0.00%	0.09%
Allen	0.00%	0.07%	0.07%	0.01%	0.00%	0.15%
Ascension	0.00%	0.02%	0.02%	0.01%	0.01%	0.05%
Assumption	0.00%	0.01%	0.03%	0.00%	0.00%	0.04%
Avoyelles	0.00%	0.04%	0.07%	0.00%	0.00%	0.11%
Beauregard	0.00%	0.12%	0.09%	0.01%	0.00%	0.22%
Bienville	0.01%	0.09%	0.25%	0.02%	0.00%	0.36%
Bossier	0.01%	0.21%	0.44%	0.09%	0.01%	0.75%
Caddo	0.01%	0.35%	0.62%	0.11%	0.03%	1.12%
Calcasieu	0.00%	0.21%	0.19%	0.01%	0.00%	0.40%
Caldwell	0.00%	0.07%	0.19%	0.01%	0.00%	0.27%
Cameron	0.00%	0.03%	0.05%	0.01%	0.00%	0.09%
Catahoula	0.00%	0.03%	0.03%	0.02%	0.00%	0.09%
Claiborne	0.00%	0.10%	0.22%	0.01%	0.00%	0.33%
Concordia	0.00%	0.03%	0.03%	0.01%	0.01%	0.09%
De Soto	0.00%	0.16%	0.34%	0.02%	0.01%	0.53%
East Baton Rouge	0.00%	0.06%	0.10%	0.01%	0.00%	0.17%
East Carroll	0.00%	0.07%	0.11%	0.02%	0.00%	0.21%
East Feliciana	0.00%	0.01%	0.02%	0.00%	0.00%	0.03%
Evangeline	0.00%	0.05%	0.06%	0.01%	0.00%	0.12%
Franklin	0.00%	0.06%	0.21%	0.02%	0.00%	0.30%
Grant	0.00%	0.05%	0.09%	0.01%	0.00%	0.15%
Iberia	0.00%	0.03%	0.03%	0.00%	0.00%	0.06%
Iberville	0.00%	0.02%	0.05%	0.00%	0.00%	0.07%
Jackson	0.01%	0.09%	0.14%	0.05%	0.00%	0.29%
Jefferson	0.00%	0.03%	0.09%	0.01%	0.01%	0.14%
Jefferson Davis	0.00%	0.05%	0.05%	0.00%	0.00%	0.10%
La Salle	0.00%	0.06%	0.05%	0.01%	0.00%	0.12%
Lafayette	0.00%	0.03%	0.11%	0.01%	0.00%	0.14%
Lafourche	0.00%	0.05%	0.05%	0.00%	0.00%	0.10%
Lincoln	0.01%	0.10%	0.21%	0.02%	0.00%	0.34%
Livingston	0.00%	0.03%	0.09%	0.00%	0.00%	0.13%
Madison	0.00%	0.06%	0.17%	0.02%	0.00%	0.26%
Morehouse	0.00%	0.13%	0.22%	0.03%	0.00%	0.38%
Natchitoches	0.02%	0.15%	0.29%	0.01%	0.00%	0.46%
Orleans	0.00%	0.06%	0.07%	0.00%	0.00%	0.13%
Ouachita	0.01%	0.14%	0.26%	0.05%	0.01%	0.47%
Plaquemines	0.00%	0.01%	0.03%	0.01%	0.00%	0.06%
Pointe Coupee	0.00%	0.04%	0.05%	0.00%	0.00%	0.09%
Rapides	0.00%	0.19%	0.21%	0.02%	0.00%	0.42%
Red River	0.00%	0.06%	0.15%	0.02%	0.00%	0.23%

Probability of Hailstorms by Size of Hail Stone by Parish (48-year period)						
Parish	Hail Stone Size in Inches					Probability for All Hailstone Sizes
	0-.74	.75-.99	1-1.9	2-2.9	3.0+	
Richland	0.00%	0.05%	0.15%	0.01%	0.00%	0.21%
Sabine	0.00%	0.11%	0.26%	0.02%	0.01%	0.39%
St. Bernard	0.00%	0.02%	0.03%	0.00%	0.00%	0.05%
St. Charles	0.01%	0.02%	0.07%	0.01%	0.00%	0.10%
St. Helena	0.00%	0.00%	0.02%	0.00%	0.00%	0.02%
St. James	0.00%	0.01%	0.02%	0.00%	0.00%	0.03%
St. John the Baptist	0.00%	0.01%	0.02%	0.00%	0.00%	0.03%
St. Landry	0.00%	0.03%	0.05%	0.01%	0.00%	0.09%
St. Martin	0.00%	0.02%	0.02%	0.01%	0.00%	0.05%
St. Mary	0.00%	0.02%	0.02%	0.00%	0.00%	0.04%
St. Tammany	0.00%	0.05%	0.10%	0.00%	0.01%	0.16%
Tangipahoa	0.00%	0.03%	0.10%	0.00%	0.00%	0.13%
Tensas	0.00%	0.10%	0.10%	0.03%	0.00%	0.22%
Terrebonne	0.00%	0.02%	0.03%	0.00%	0.00%	0.06%
Union	0.00%	0.09%	0.22%	0.02%	0.00%	0.33%
Vermilion	0.00%	0.03%	0.05%	0.00%	0.00%	0.08%
Vernon	0.00%	0.09%	0.13%	0.02%	0.00%	0.23%
Washington	0.00%	0.02%	0.07%	0.01%	0.00%	0.10%
Webster	0.01%	0.16%	0.38%	0.03%	0.00%	0.57%
West Baton Rouge	0.00%	0.01%	0.03%	0.00%	0.00%	0.05%
West Carroll	0.00%	0.07%	0.11%	0.01%	0.00%	0.19%
West Feliciana	0.00%	0.03%	0.01%	0.00%	0.00%	0.04%
Winn	0.00%	0.08%	0.15%	0.01%	0.00%	0.25%
Statewide Probability	0.08%	4.32%	7.74%	0.82%	0.09%	13.04%

Appendix D
Additional Hurricane Hazard Information

**Average Wind Speed By Category Of Historical Hurricanes And Tropical Storms,
1851-2001**

Name	Year	Tropical Storm	Category 1	Category 2	Category 3	Category 4	Category 5
Not Named	1855				120		
Not Named	1856	57	92		126	150	
Not Named	1860				118		
Not Named	1860			103			
Not Named	1860			103			
Not Named	1865	53	81	103			
Not Named	1867			103			
Not Named	1868	69					
Not Named	1869	57	81				
Not Named	1872	57					
Not Named	1875	46					
Not Named	1877		81				
Not Named	1879	49					
Not Named	1879			103	126		
Not Named	1879	57					
Not Named	1885	57					
Not Named	1885	57					
Not Named	1885	69					
Not Named	1886	57					
Not Named	1886	57	81	98			
Not Named	1887		75	98			
Not Named	1888		83	103			
Not Named	1889			98			
Not Named	1891	53					
Not Named	1892	54					
Not Named	1893		91	98			
Not Named	1893		92	98			
Not Named	1895	56					
Not Named	1895	40					
Not Named	1897		82				
Not Named	1898	49					
Not Named	1900	51					
Not Named	1901		83				
Not Named	1902	69					
Not Named	1904	40					
Not Named	1905	43					
Not Named	1905	41					
Not Named	1907	42					
Not Named	1909	57	75	102			
Not Named	1912	50					
Not Named	1914	40					
Not Named	1915	69		98			

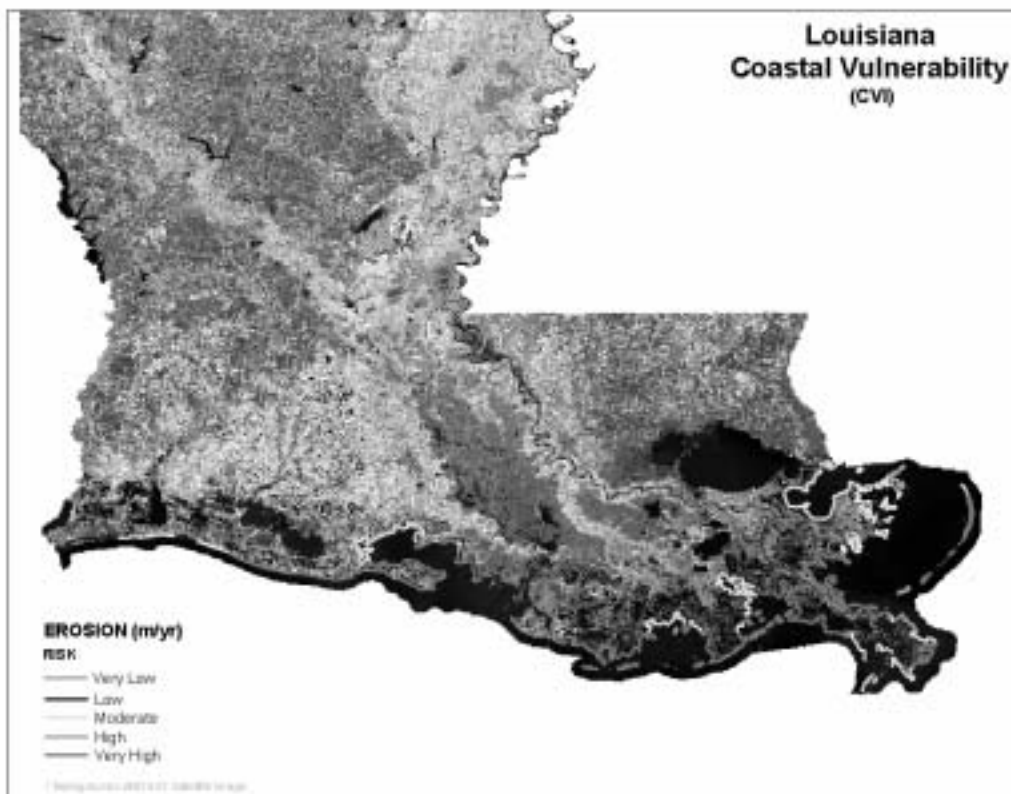
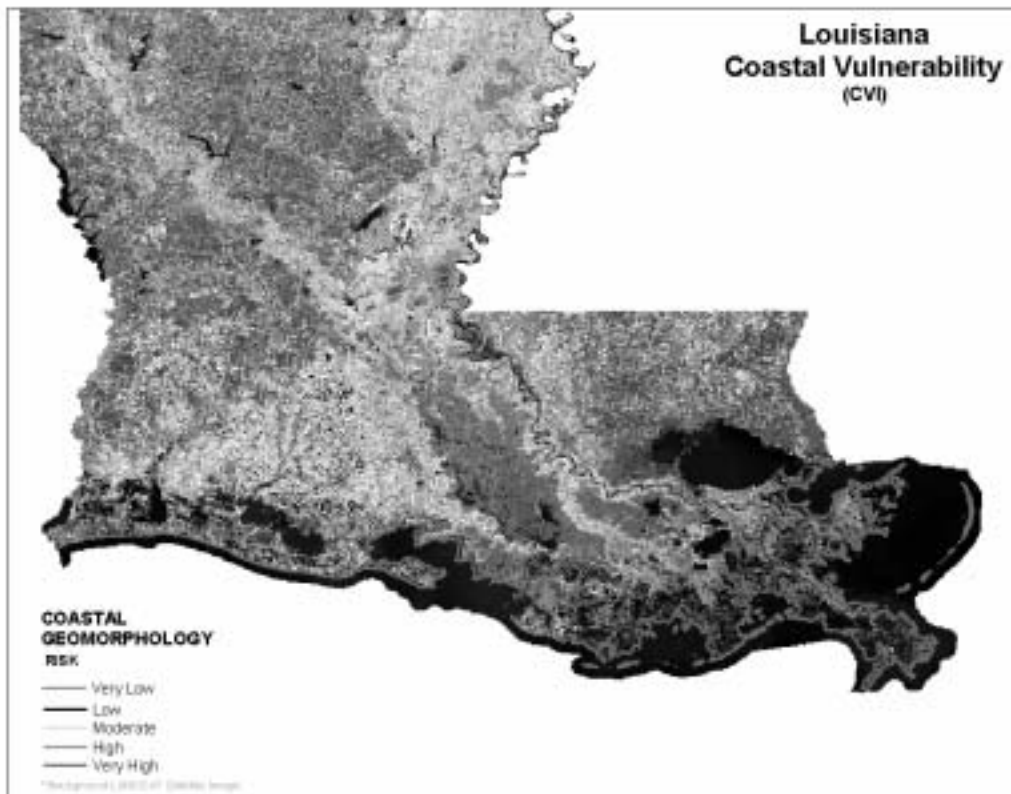
**Average Wind Speed By Category Of Historical Hurricanes And Tropical Storms,
1851-2001**

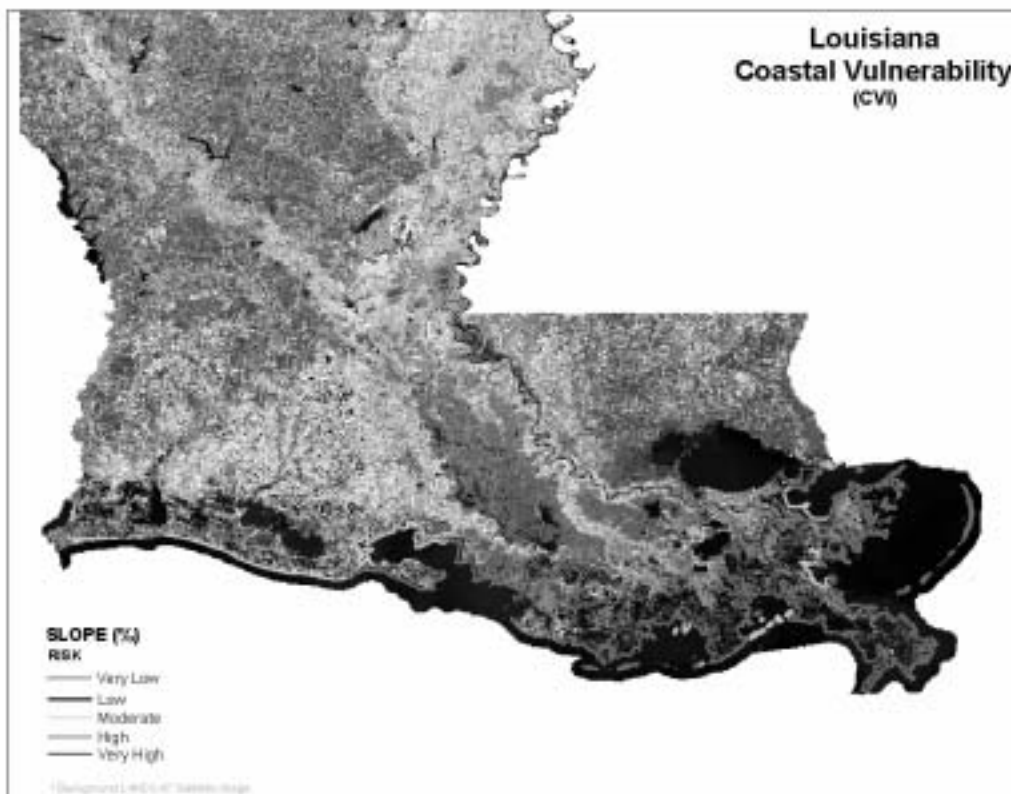
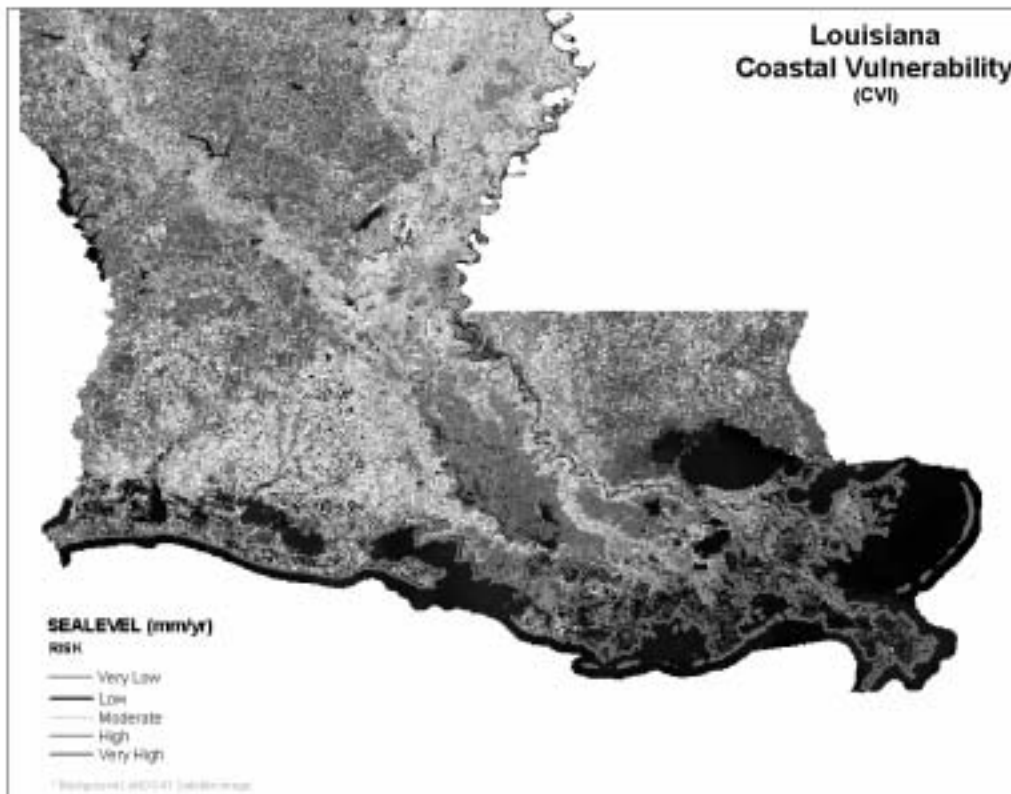
Name	Year	Tropical Storm	Category 1	Category 2	Category 3	Category 4	Category 5
Not Named	1918	46		98			
Not Named	1920	52	81	103			
Not Named	1923	63		98			
Not Named	1923	52					
Not Named	1926	55	81	98			
Not Named	1926	50					
Not Named	1931	46					
Not Named	1932	40					
Not Named	1932	46					
Not Named	1933						
Not Named	1934	69	75				
Not Named	1936	46					
Not Named	1937	40					
Not Named	1938	40	75				
Not Named	1939	41					
Not Named	1940		81				
Not Named	1940	42					
Not Named	1941	46					
Not Named	1941	52					
Not Named	1943	40					
Not Named	1944	45					
Not Named	1945						
Not Named	1946	40					
Not Named	1947	63	90				
Not Named	1948	63	75				
Not Named	1949	46					
Not Named	1949	52					
Barbara	1954	40					
Brenda	1955	59					
Not Named	1955	46					
Not Named	1956	49					
Flossy	1956		86				
Audrey	1957	61				144	
Bertha	1957	69					
Esther	1957	52					
Arlene	1959	46					
Ethel	1960	69	92				
Hilda	1964	69		109	115		
Betsy	1965	57	75	103		155	
Debbie	1965						
Camille	1969						190
Edith	1971	69		98			
Fern	1971						

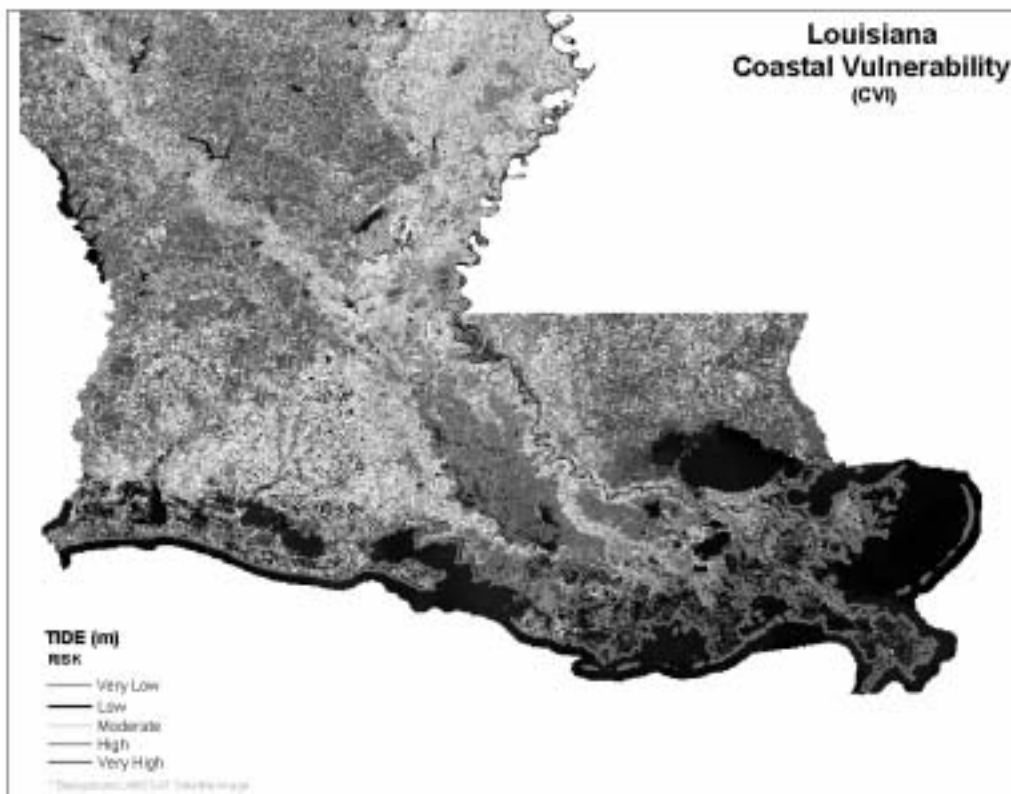
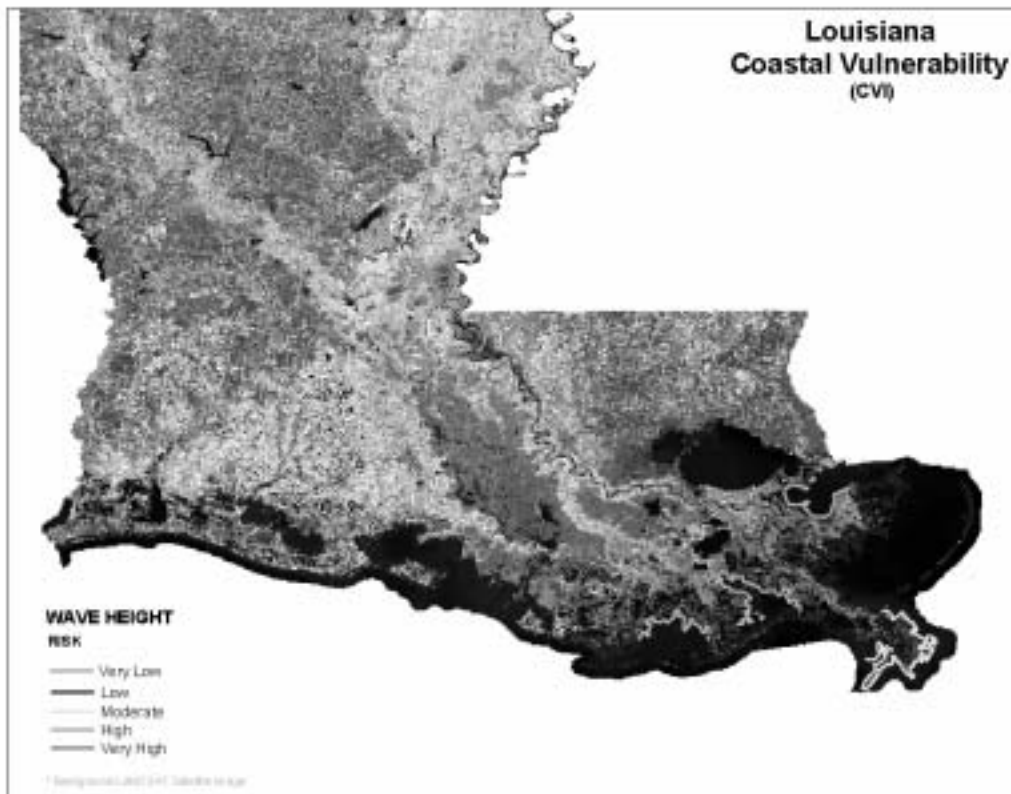
**Average Wind Speed By Category Of Historical Hurricanes And Tropical Storms,
1851-2001**

Name	Year	Tropical Storm	Category 1	Category 2	Category 3	Category 4	Category 5
Carmen	1974	52	86		121	150	
Babe	1977	57	75				
Debra	1978	57					
Bob	1979	46	75				
Claudette	1979	52					
Chris	1982	58					
Danny	1985	52	85				
Elena	1985	56			115		
Juan	1985	65	77				
Not Named	1987						
Beryl	1988	49					
Florence	1988	69	81				
Andrew	1992	57	92			132	
Danny	1997	63	78				
Hermine	1998	42					
Allison	2001						
Total Number Of Category	101	6	5	18	9	4	19

Appendix E
Additional Land Failure Hazard Information







Appendix F
Additional Tornado Hazard Information

Appendix F
Additional Tornado Hazard Information

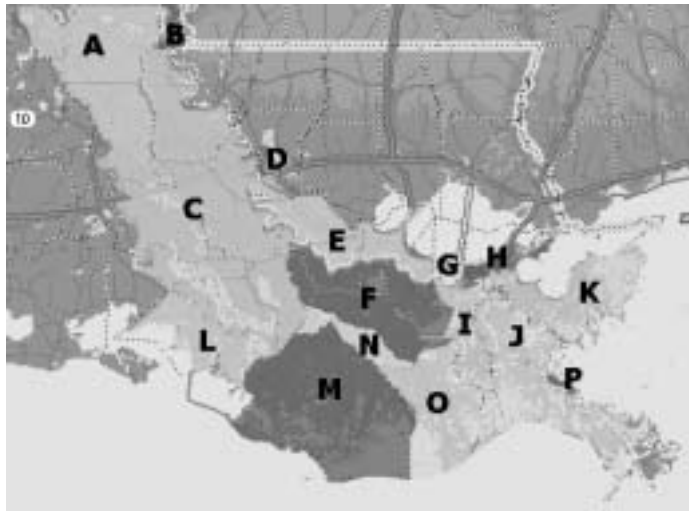
Tornado Occurrences in Louisiana by Parish and by Magnitude							
Parish	F0	F1	F2	F3	F4	F5	Total
Acadia	13	19	8	6			46
Allen	6	4	1	1			12
Ascension	1	3	3	1			8
Assumption	6	2	6				14
Avoyelles	4	9	9	2			24
Beauregard	3	19	6				28
Bienville	4	13	3	3			23
Bossier	1	22	7	8	3		41
Caddo	6	30	9	8	2		55
Calcasieu	26	33	8	4			71
Caldwell	1	3	2	3			9
Cameron	22	15	5	2			44
Catahoula	4	5	4	2			15
Claiborne		12	3	5			20
Concordia	2	13	2	3			20
De Soto	4	18	8	8	1		39
East Baton Rouge	5	16	7	3			31
East Carroll	2	11	7	2		1	23
East Feliciana	3	4	3	1			11
Evangeline	2	17	2				21
Franklin	2	10	8	1			21
Grant	2	7	3	1	3		16
Iberia	8	7	4				19
Iberville	2	4	3	1			10
Jackson	2	14	5	1			22
Jefferson	12	11	7				30
Jefferson Davis	10	12	7	2			31
La Salle	3	2	2	1	1		9
Lafayette	5	15	6	1			27
Lafourche	6	18	2		1		27
Lincoln	4	6	8				18
Livingston	3	15	2	1			21
Madison	8	13	13	5		1	40
Morehouse	3	19	4	1	1		28
Natchitoches	10	9	5	7			31

Appendix F
Additional Tornado Hazard Information

Tornado Occurrences in Louisiana by Parish and by Magnitude							
Parish	F0	F1	F2	F3	F4	F5	Total
Orleans	3	5	4				12
Ouachita	12	14	3	1	1		31
Plaquemines	6	10	4	1			21
Pointe Coupee		8		2			10
Rapides	9	13	9	4	2		37
Red River	3	3	3	1			10
Richland	3	9	5	3			20
Sabine	3	5	4	5			17
St. Bernard	1	3					4
St. Charles	2	4	1	1			8
St. Helena		4	3	1			8
St. James	1						1
St. John the Baptist	5	3	1	1	1		11
St. Landry	3	21	6	4			34
St. Martin	2	5	4	1			12
St. Mary		10	3	1			14
St. Tammany	11	9	4				24
Tangipahoa	14	17	9	1			41
Tensas	5	6	6	4			21
Terrebonne	7	14	2	1			24
Union	2	16	5	3			26
Vermilion	13	20	3	3			39
Vernon	7	15	6		1		29
Washington	5	9	2	1			17
Webster	3	19	7	3	1		33
West Baton Rouge	3	3	3	1			10
West Carroll	2	6	7	2			17
West Feliciana		5	2				7
Winn	1	12	4	3			20
Grand Total	321	698	292	132	18	2	1463

Appendix G
Additional Dam and Levee Failure Information

Louisiana Levee District Map



A. Red River, Atchafalaya, and Bayou Boeuf

B. Fifth Louisiana

C. Atchafalaya Basin

D. Metro Council of Baton Rouge

E. Pontchartrain

F. Lafourche Basin

G. East Jefferson

H. Orleans

I. West Jefferson

J. Plaquemines Parish

K. Lake Borgne Basin

L. St. Mary Parish Council

M. Terrebonne

N. North Lafourche

O. South Lafourche

P. Orleans District, Bohemia Spillway

Source: USACE, <http://www.mvn.usace.army.mil/pao/response/LeveeDistrictMap.asp>

Appendix H
Additional Hazardous Materials Hazard Information



2000 Toxics Release Inventory

LOUISIANA

Reported Releases and Waste Management Activities (in pounds)

	Original Industry	New Industry	Total
On-site Releases	130,338,368	19,133,833	149,472,201
Air Emissions	68,897,981	1,459,982	70,357,963
Surface Water Discharges	12,785,742	82,493	12,868,235
Underground Injection Class I Wells	42,556,468	9,147,515	51,703,983
Underground Injection Class II-V Wells	0	0	0
On-site Land Releases to RCRA Subtitle C Landfills	352,692	3,986,588	4,339,280
Other On-site Land Releases	5,745,484	4,457,255	10,202,739
Off-site Releases (Transfers Off-site to Disposal)*	4,877,302	173,132	5,050,434
Total On- and Off-site Releases	135,215,670	19,306,965	154,522,635
Recycled On-site	790,320,585	177,753	790,498,338
Recycled Off-site	42,239,031	468,561	42,707,592
Energy Recovery On-site	382,588,374	0	382,588,374
Energy Recovery Off-site	18,463,478	147,259	18,610,737
Treated On-site	8,009,727,277	2,530,731	8,012,258,008
Treated Off-site**	14,137,404	1,632,632	15,770,036
Quantity Released On- and Off-site***	134,512,163	19,652,807	154,164,970
Total Production-related Waste Managed	9,391,988,312	24,609,743	9,416,598,055
Non-production-related Waste Managed	359,935	1,247	361,182
Transfers Off-site for Further Waste Management/Disposal			
Recycling	31,550,564	1,340,699	32,891,263
Energy Recovery	18,679,582	165,273	18,844,855
Treatment	13,323,420	1,483,306	14,806,726
Publicly Owned Treatment Works (POTWs)	562,993	162	563,155
Metals and Metal Compounds*	9,633	0	9,633
Non-metal TRI Chemicals**	553,360	162	553,522
Other Off-site Transfers****	58,212	0	58,212
Transfers Off-site to Disposal (not including metals to POTWs)	5,036,233	234,842	5,271,075
Total Transfers Off-site for Further Waste Management/Disposal	69,211,004	3,224,282	72,435,286

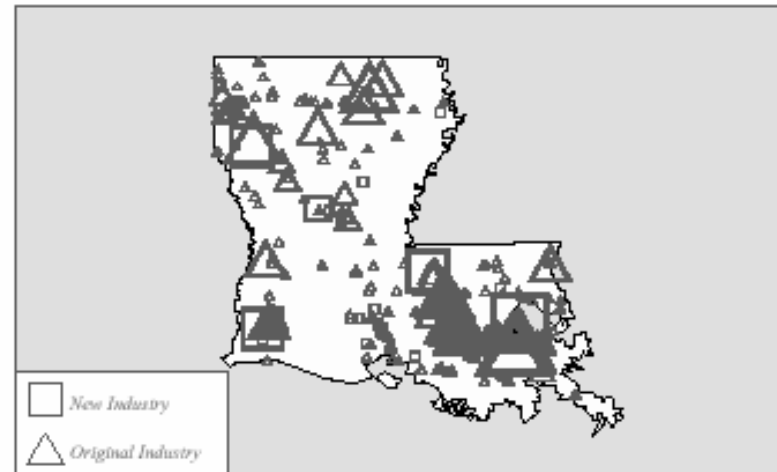
* Transfers to POTWs of metals and metal compounds are included in off-site releases. Excludes transfer amounts sent for disposal to other TRI facilities reporting that amount released on-site.
 ** Transfers to POTWs of non-metals are included in treated off-site waste management activity.
 *** Excludes non-production-related releases, e.g. releases due to catastrophic events or remedial actions.
 **** Transfers reported without a valid waste management code.

For More Information . . .

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Dallas, TX 75202-2733
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layne.warren@epa.gov

To obtain TRI data use assistance, call TRI User Support Service (TRI-US):
(202) 566-0250
Fax: (202) 401-2347
tri.us@epa.gov



The largest marker in the state map represents the largest facility for on-site releases in the state of Louisiana. All markers are proportionally-sized to represent the on-site releases at each facility within this state.

State/TRI Data

Population	4,469,970
Square Miles	43,566
Total Facilities	369
Total Forms	2,706
Form As	282

	Original Industry	New Industry	Total
National Rank for Total On- and Off-site Releases*			
Rank	4	30	11
Pounds	135,215,670	19,306,965	154,522,635
National Rank for Total On-site Releases**			
Rank	2	28	9
Pounds	130,338,368	19,133,833	149,472,201
National Rank for Total Releases within State***			
Rank	3	25	10
Pounds	144,041,835	26,653,835	170,695,670
National Rank for Production-related Waste Managed			
Rank	1	34	1
Pounds	9,391,988,312	24,609,743	9,416,598,055

* Includes transfers out-of-state for disposal. Excludes transfer amounts sent for disposal to other TRI facilities reporting that amount released on-site.
 ** Includes amounts released at the facility. Excludes amounts transferred to other sites.
 *** Excludes transfers for disposal sent out-of-state or sent to other TRI facilities within the state reporting that amount released on-site.



2000 Toxics Release Inventory

LOUISIANA

On-site and Off-site Releases for Top Five Chemicals Ranked on Total Releases in the State (All Chemicals)

CAS Number	Chemical	On-site Releases				Off-site Releases	Total Releases in the State**	Off-site Transfers to Disposal		
		Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	On-site Releases to Land Pounds	Transfers Off-site to Disposal* Pounds		Transferred Into State Pounds	Transferred Within State Pounds	Transferred Out of State Pounds
7664-41-7	Ammonia	18,947,599	765,921	4,522,739	5,111	40,600	24,281,970	214,929	42,630	250
67-56-1	Methanol	16,727,099	183,204	3,439,486	309,980	11,603	20,671,372	54,991	8,988	2,615
—	Nitrate compounds	0	11,001,475	9,098,607	62,880	26,610	20,189,572	6,890,000	26,610	0
50-00-0	Formaldehyde	460,164	23,466	10,519,748	3,853	11,539	11,018,770	15,268	10,428	1,111
75-05-8	Acetonitrile	45,392	595	7,900,000	0	9	7,945,996	482	9	0

* Excludes amounts transferred to other TRI facilities in the state reporting that amount released on-site.

** The chemical ranking is based on the amounts in this column.

On-site and Off-site Releases for PBT Chemicals Ranked on Total Releases in the State

CAS Number	Chemical	On-site Releases				Off-site Releases	Total Releases in the State**	Off-site Transfers to Disposal		
		Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	On-site Releases to Land Pounds	Transfers Off-site to Disposal* Pounds		Transferred Into State Pounds	Transferred Within State Pounds	Transferred Out of State Pounds
—	Polycyclic aromatic compounds	97,518.71	1,928.79	0.00	904.50	67,148.71	167,500.72	20.00	67,444.36	258.48
—	Mercury compounds	2,152.89	56.00	10.32	1,489.55	8,270.63	11,979.39	577,175.11	8.98	8,261.65
118-74-1	Hexachlorobenzene	347.61	17.50	0.00	11,041.00	0.50	11,406.61	10,836.00	7.50	0.00
191-24-2	Benzo(g,h,i)perylene	1,391.31	5.80	0.00	82.70	1,527.27	3,007.08	6.00	1,526.47	0.80
7439-97-6	Mercury	1,418.47	21.60	435.00	65.88	663.96	2,604.91	0.30	509.00	157.30
1336-36-3	Polychlorinated biphenyls (PCBs)	0.00	0.00	0.00	8.00	820.00	828.00	1.00	820.00	0.00
79-94-7	Tetrabromobisphenol A	0.00	0.00	0.00	0.00	510.00	510.00	90,102.00	510.00	0.00
—	Dioxin and dioxin-like compounds	0.23	2.06	0.00	2.92	1.71	6.92	0.04	1.73	0.00
—	Dioxin and dioxin-like compounds (in grams)	103.501	934.682	0.225	1,323.051	784.182	3,145.640	17.184	784.149	0.032
608-93-5	Pentachlorobenzene	2.84	0.71	0.00	1.90	0.00	5.45	0.00	0.00	0.00
57-74-9	Chlordane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72-43-5	Methoxychlor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76-44-8	Heptachlor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
309-00-2	Aldrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1582-09-8	Trifluralin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8001-35-2	Toxaphene	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00
29082-74-4	Octachlorostyrene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
465-73-6	Isodrin	—***	—	—	—	—	—	—	—	—
40487-42-1	Pendimethalin	—***	—	—	—	—	—	—	—	—

* Excludes amounts transferred to other TRI facilities in the state reporting that amount released on-site.

** The chemical ranking is based on the amounts in this column.

*** No reports were submitted for these chemicals.



2000 Toxics Release Inventory

LOUISIANA

On-site and Off-site Releases for Top Ten Facilities Ranked on Total On-site Releases in the State (All Chemicals)

Facility, City, County	On-site Releases						Total On-site Releases ^a Pounds	Off-site Releases	
	Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Releases to Land			Transferred Within State Pounds	Transferred Out of State Pounds
			Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
Cytec Inds. Inc. Fortier Plant, Westwego, Jefferson	435,554	27,694	16,429,470	0	0	0	16,892,718	25,623	83
Monsanto Luling, Luling, St Charles	135,445	215,710	10,577,300	0	0	336	10,928,791	17,502	0
Safety-Kleen (Plaquemine) Inc., Plaquemine, Iberville	156	0	9,147,515	0	0	0	9,147,671	0	1,392
Angus Chemical Co., Sterlington, Ouachita	141,298	512,712	6,170,671	0	0	360	6,825,041	0	0
CF Inds. Inc., Donaldsonville, Ascension	5,358,690	612,600	0	0	0	0	5,971,290	9,560	0
Rubicon Inc., Geismar, Ascension	495,941	148	5,350,210	0	0	0	5,846,299	4,566	20
ExxonMobil Refining & Supply Baton Rouge Refy., Baton Rouge, East Baton Rouge	1,483,527	3,555,911	0	0	0	290	5,039,728	25,056	105,061
PCS Nitrogen Fertilizer L.P., Geismar, Ascension	4,046,833	749,964	0	0	0	7,905	4,804,702	14,219	0
International Paper, Mansfield, De Soto	3,925,362	48,012	0	0	0	499,176	4,472,550	0	0
Chemical Waste Management Lake Charles Facility, Sulphur, Calcasieu	1,009	0	0	0	3,986,588	0	3,987,597	0	67,590

^a The facility ranking is based on the amounts in this column; these quantities exclude transfers out of state.

On-site and Off-site Releases for Top Ten Facilities Ranked on Total On-site Releases in the State (PBT Chemicals)

Facility, City, County	On-site Releases						Total On-site Releases ^a Pounds	Off-site Releases	
	Underground Injection				On-site Releases to Land			(Transfers Off-site to Disposal)	
	Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transferred Within State Pounds	Transferred Out of State Pounds
Calumet Lubricants Co. L.P., Princeton, Bossier	65,610.00	0.00	0.00	0.00	0.00	0.00	65,610.00	0.00	0.00
Chemical Waste Management Lake Charles Facility, Sulphur, Calcasieu	0.00	0.00	0.00	0.00	12,288.02	0.00	12,288.02	0.00	734.00
Lake Charles Carbon Co., Lake Charles, Calcasieu	11,458.50	0.00	0.00	0.00	0.00	0.00	11,458.50	61,376.40	0.00
ExxonMobil Refining & Supply Baton Rouge Refy., Baton Rouge, East Baton Rouge	7,150.19	4.00	0.00	0.00	0.00	0.00	7,154.19	0.26	0.00
Motiva Norco, Norco, St Charles	3,702.32	0.00	0.00	0.00	0.00	75.00	3,777.32	2.00	2.03
International Paper Co. Louisiana Mill, Bastrop, Morehouse	2,298.41	14.16	0.00	0.00	0.00	82.56	2,395.13	0.00	0.00
Calcasieu Refining Co., Lake Charles, Calcasieu	2,280.00	1.10	0.00	0.00	0.00	1.10	2,282.20	0.00	0.00
Exxon Chemical Baton Rouge Chemical Plant, Baton Rouge, East Baton Rouge	53.10	1,801.00	0.00	0.00	0.00	0.00	1,854.10	789.00	0.00
Valero Refining Co. Louisiana, Krotz Springs, St Landry	1,501.00	0.00	0.00	0.00	0.00	0.00	1,501.00	101.00	0.00
Shell Norco Chemical Plant East Site, Norco, St Charles	1,305.00	0.00	0.00	0.00	0.00	0.00	1,305.00	1.26	0.00

^a The facility ranking is based on the amounts in this column; these quantities exclude transfers out of state.



2000 Toxics Release Inventory

LOUISIANA

Total Production-related Waste for Top Ten Facilities Ranked on Quantity Released On- and Off-site (All Chemicals)

Facility, City, County	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site* Pounds	Total Production-related Waste Managed Pounds	Total Non-Production-related Waste Managed Pounds
Cytec Inds. Inc. Fortier Plant, Westwego, Jefferson	8,187,200	128,800	22,683,540	160	22,452,302	5,989	17,138,644	70,596,635	18,000
Monsanto Luling, Luling, St Charles	0	81,000	0	0	35,150,900	71,200	10,946,593	46,249,693	0
Safety-Kleen (Plaquemine) Inc., Plaquemine, Iberville	0	0	0	0	1,399	0	9,147,670	9,149,069	0
Angus Chemical Co., Sterlington, Ouachita	4,553,385	57,775	2,073,962	0	81,240	129,489	6,829,693	13,725,544	0
CF Inds. Inc., Donaldsonville, Ascension	0	122,240	463,000	0	0	4,800	5,980,172	6,570,212	0
Rubicon Inc., Geismar, Ascension	0	6	11,821,000	268,150	825,000	162,693	5,838,447	18,915,296	0
ExxonMobil Refining & Supply Baton Rouge Refy., Baton Rouge, East Baton Rouge	0	9,521	0	4,251	4,069,604	8	5,169,844	9,253,228	0
PCS Nitrogen Fertilizer L.P., Geismar, Ascension	0	101,770	0	0	990,088	0	4,818,823	5,910,681	0
Chemical Waste Management Lake Charles Facility, Sulphur, Calcasieu	0	2,560	0	1,693	10,310	39,996	4,477,388	4,531,947	0
International Paper, Mansfield, De Soto	0	0	954,107	0	4,738,403	0	4,472,550	10,165,060	0

* The facility ranking is based on the amounts in this column; these quantities exclude non-production-related releases.

Total Production-related Waste for Top Ten Facilities Ranked on Quantity Released On- and Off-site (PBT Chemicals)

Facility, City, County	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site* Pounds	Total Production-related Waste Managed Pounds	Total Non-Production-related Waste Managed Pounds
Lake Charles Carbon Co., Lake Charles, Calcasieu	0	147,187	0	0	0	0	72,835	220,022	0
Calumet Lubricants Co. L.P., Princeton, Bossier	0	0	0	0	0	0	65,610	65,610	0
Chemical Waste Management Lake Charles Facility, Sulphur, Calcasieu	0	2,200	0	3	210	148	13,088	15,649	0
Borden Chemicals & Plastics Operating L.P., Geismar, Ascension	0	1	0	0	5,213	4	7,246	12,464	0
ExxonMobil Refining & Supply Baton Rouge Refy., Baton Rouge, East Baton Rouge	0	0	0	0	4	0	7,154	7,158	0
Cabot Corp. Canal Plant, Franklin, St Mary	0	0	0	0	59	0	4,208	4,267	0
Motiva Norco, Norco, St Charles	0	0	0	0	0	0	3,804	3,804	1
Conoco Lake Charles Refy., Westlake, Calcasieu	0	0	0	0	2,073	0	2,903	4,976	0
Exxon Chemical Baton Rouge Chemical Plant, Baton Rouge, East Baton Rouge	0	11	0	0	73,744	1,051	2,643	77,449	0
International Paper Co. Louisiana Mill, Bastrop, Morehouse	0	0	0	0	0	0	2,395	2,395	0

* The facility ranking is based on the amounts in this column; these quantities exclude non-production-related releases.

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Additional Natural Biohazards Information

Cumulative West Nile Human Cases by Parish			
Parish	Number of Cases	Parish	Number of Cases
Allen Parish	1	Red River Parish	1
Ascension Parish	14	Richland Parish	2
Avoyelles Parish	2	Saint Bernard Parish	2
Bossier Parish	3	Saint Charles Parish	1
Caddo Parish	5	Saint Helena Parish	1
Calcasieu Parish	10	Saint James Parish	3
Concordia Parish	1	Saint John the Baptist Parish	3
East Baton Rouge Parish	49	Saint Landry Parish	1
East Feliciana Parish	4	Saint Martin Parish	1
Evangeline Parish	1	Saint Mary Parish	1
Grant Parish	1	Saint Tammany Parish	39
Iberia Parish	2	Tangipahoa Parish	24
Iberville Parish	5	Tensas Parish	1
Jefferson Parish	40	Terrebonne Parish	1
Lafayette Parish	4	Union Parish	1
Livingston Parish	17	Vernon Parish	1
Orleans Parish	21	Washington Parish	10
Ouachita Parish	10	West Baton Rouge Parish	2
Pointe Coupee Parish	12	Winn Parish	1
Rapides Parish	21		

Source: Centers for Disease Control, 2002

Appendix I
Additional Natural Biohazards Hazard Information

Reported Cases for Louisiana by Year, 1970-1984															
DISEASE	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
AIDS	0	0	0	0	0	0	0	0	0	0	0	0	0	18	59
Amebiasis	18	8	15	7	34	8	7	6	6	9	14	16	5	8	7
Blastomycosis	2	9	12	12	6	3	3	3	0	2	2	0	0	0	0
Botulism	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Campylobacteriosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera	0	0	0	0	0	0	0	0	11	0	0	13	0	0	0
Cryptococcosis	3	2	6	5	4	2	5	1	2	2	5	2	3	1	0
Cryptosporidium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dengue	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
Diphtheria	31	28	6	0	0	0	0	0	0	0	0	0	0	0	0
Enceph, Arthropodborne	0	1	0	0	0	6	9	4	0	0	12	0	5	0	0
Enceph, Oth & Unsp	18	18	16	17	23	33	33	19	17	27	15	9	27	23	14
Enceph, Post-infection	19	14	18	16	5	14	7	1	7	0	0	0	0	0	0
Enterococcus (Infection; VRE)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. Coli 0157:H7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gonorrhea	-	14507	18184	23503	24590	21449	18837	19876	22726	23883	22577	23376	24352	23472	25412
H. Influenzae Infection	-	-	-	-	-	-	-	-	-	-	-	-	13	93	118
Hemolytic-uremic Syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	596	671	630	773	446	400	399	521	550	644	682	772	781	600	316
Hepatitis B	81	136	111	152	176	190	174	187	215	307	311	363	349	353	326
Hepatitis C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis, Unspec	0	0	0	0	176	175	176	193	197	236	251	400	288	118	88

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Additional Natural Biohazards Hazard Information

Reported Cases for Louisiana by Year, 1970-1984															
DISEASE	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
Histoplasmosis	6	6	7	8	7	4	3	7	4	4	1	0	2	0	0
Human Immunodeficiency Virus (HIV)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Legionellosis	-	-	-	-	-	-	-	10	7	5	4	0	6	4	
Listeriosis	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Lyme Disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lymphogranuloma vener	35	40	36	24	25	21	5	14	6	0	3	1	0	4	4
Malaria	53	38	7	2	1	1	2	3	4	6	59	4	8	10	12
Measles	345	1719	112	91	13	33	306	131	385	268	15	13	16	28	8
Meningitis, Other Bacterial or Fungal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mumps	50	163	339	156	323	325	41	70	68	32	67	6	6	1	0
Mycobacterium Atypical	77	59	69	70	35	23	66	46	42	89	92	98	89	109	85
Neisseria Meningitidis Infection	76	72	53	51	53	40	57	151	153	155	102	138	66	58	68
Pertussis	33	82	44	12	20	57	15	13	4	18	38	8	24	11	12
Rabies in Animals	69	61	49	52	23	7	8	23	17	43	19	34	32	37	62
Rabies in Man	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reye Syndrome	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4
Rheumatic Fever	11	10	16	27	22	12	15	8	8	2	1	0	0	0	0
RMSF	1	1	0	0	1	2	0	7	2	3	4	2	2	2	6
Rubella	160	298	96	100	178	295	92	30	494	31	13	9	1	10	0
Rubella, Congenital	5	2	6	1	0	1	1	0	0	1	0	0	0	0	0
Salmonellosis	94	155	214	281	246	232	116	169	179	199	213	235	222	249	219
Shigellosis	30	38	306	338	175	122	118	164	122	123	233	155	114	81	110
Staphylococcus Aureus (MRSA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Additional Natural Biohazards Hazard Information

Reported Cases for Louisiana by Year, 1970-1984															
DISEASE	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
Streptococcus Pneumonia (Infection; resistant to Penicillin)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syphilis (total)	2117	2009	2200	2237	1676	1477	1454	1513	1633	2257	3043	3299	3641	3689	2844
Tetanus	5	3	7	4	3	5	2	3	2	6	5	3	7	4	3
Toxic Shock Syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tuberculosis, Other	86	61	53	75	38	80	124	81	109	128	101	111	73	46	40
Tuberculosis, Pulmonary	769	814	640	558	551	521	493	535	540	509	478	423	398	393	337
Typhoid Fever	9	6	7	6	10	13	3	1	4	5	2	3	4	4	2
Varicella (Chickenpox)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vibrio, Non-Cholera	-	-	-	-	-	-	-	-	-	-	19	34	30	28	29

* Includes AIDS Cases

** Reported in selected hospitals July - December, 1996

See Human Immunodeficiency Virus (HIV)

Appendix I
Additional Natural Biohazards Hazard Information

Reported Cases for Louisiana by Year, 1985-1999															
DISEASE	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
AIDS	140	200	324	395	592	686	898	1002							
Amebiasis	3	4	1	8	16	1	1	3	5	2	2	9	5	7	7
Blastomycosis	0	3	1	6	7	5	5	8	8	4	11	7	6	5	3
Botulism	0	0	0	0	1	0	0	1	0	0	1	2	1	0	1
Campylobacteriosis	-	-	-	110	114	142	83	280	177	164	200	161	181	149	136
Chlamydia	-	-	-	-	-	-	-	10351	12302	11072	10727	10991	11512	15305	16,573
Cholera	0	20	5	1	0	2	0	2	1	0	0	1	0	4	1
Cryptococcosis	0	1	3	7	0	3	4	2	0	11	4	13	35	46	28
Cryptosporidium	-	-	-	-	-	-	-	-	-	-	-	3	23	20	24
Dengue	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enceph, Arthropodborne	0	2	0	0	0	0	1	0	0	17	1	2	4	21	2
Enceph, Oth & Unsp	15	24	32	26	26	11	18	11	10	9	6	2	2	1	1
Enceph, Post-infection	0	0	0	0	1	1	0	1	1	0	0	2	2	0	0
Enterococcus (infection; VRE)	-	-	-	-	-	-	-	-	-	-	-	16*	115	277	215
E. Coli 0157:H7	-	-	-	-	-	-	-	-	-	-	-	9	18	14	14
Gonorrhea	21256	17768	13756	13079	15723	13707	15254	14485	13260	12288	10593	9373	10761	12543	13198
H. Influenza Infection	133	129	126	112	73	22	1	0	4	4	1	6	19	29	16
Hemolytic-uremic Syndrome	-	-	-	-	-	-	-	-	-	-	-	2	2	2	0
Hepatitis A	142	135	111	181	298	218	138	234	105	171	196	261	266	173	213
Hepatitis B	253	357	550	427	419	381	362	261	269	206	244	209	208	219	172
Hepatitis C	-	-	-	-	-	19	94	124	175	215	222	290	276	137	302

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Additional Natural Biohazards Hazard Information

Reported Cases for Louisiana by Year, 1985-1999															
DISEASE	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Hepatitis, Unspec	35	24	16	20	5	9	10	3	4	2	0	0	1	0	
Histoplasmosis	0	0	0	5	2	4	5	0	4	1	4	4	5	3	1
Human Immunodeficiency Virus (HIV)*	-	-	-	-	-	-	-	-	2702	2380	1840	2048	1700	1497	1205
Legionellosis	5	5	9	8	33	15	10	7	10	20	3	4	9	6	11
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3
Lyme Disease	-	-	-	3	3	3	6	7	3	5	9	9	12	15	9
Lymphogranuloma vener	20	17	0	25	10	3	14	15	12	13	27	6	2	5	26
Malaria	6	20	4	13	3	9	17	2	8	11	7	12	20	17	11
Measles	42	4	0	1	122	10	0	3	1	1	18	1	0	0	0
Meningitis, Other Bacterial or Fungal	-	-	-	-	-	-	-	-	-	-	-	0	16	10	3
Mumps	2	11	839	365	783	118	37	35	20	39	15	24	18	9	11
Mycobacterium, Atypical	128	99	94	105	55	50	91	87	53	55	22	94	77	110	149
Neisseria Meningitis Infection	38	25	27	61	49	42	34	38	46	47	63	66	57	70	71
Pertussis	20	16	56	21	38	37	14	18	14	15	22	15	22	13	10
Rabies in Animals	20	25	13	13	17	25	7	8	17	73	54	16	7	3	6
Rabies in Man	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reye Syndrome	2	6	7	2	2	0	0	2	0	0	0	0	0	0	0
Rheumatic Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RMSF	5	2	0	2	1	3	0	2	2	1	2	2	5	5	2
Rubella	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0
Rubella, Congenital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	285	623	1020	760	738	823	769	639	650	642	590	616	617	864	718
Shigellosis	54	304	618	777	466	303	206	192	482	476	485	562	182	386	227

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Additional Natural Biohazards Hazard Information

Reported Cases for Louisiana by Year, 1985-1999															
DISEASE	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Staphylococcus Aureus (MRSA)	-	-	-	-	-	-	-	-	-	-	-	-	490	936	1033
Streptococcus Pneumonia (Infection; resistant to penicillin)	-	-	-	-	-	-	-	-	-	-	-	15**	121	137	117
Syphilis (total)	2731	2334	2176	2394	3138	5463	6865	6485	6852	5490	2366	1494	1815	431	304
Tetanus	2	7	0	4	1	2	0	1	0	2	2	2	1	2	0
Toxic Shock Syndrome	-	-	0	1	1	1	0	0	0	0	0	0	0	2	0
Tuberculosis, Other	39	48	48	40	49	60	71	73	55	70	55	57	57	54	51
Tuberculosis, Pulmonary	345	382	302	358	358	306	296	300	313	373	398	363	349	326	306
Typhoid Fever	4	5	1	5	1	1	5	1	1	4	1	1	2	1	1
Varicella (Chickenpox)	-	-	-	-	-	-	-	-	-	-	-	4	83	215	172
Vibrio, Non-cholera	27	50	45	30	36	32	46	35	40	56	44	42	36	53	30

* Includes AIDS Cases

** Reported in selected hospitals July - December, 1996

See Human Immunodeficiency Virus (HIV)